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FURTHER NOTES ON SOME ALTERNATIVE HOSTS OF THE ORIENTAL FRUIT MOTH PARASITE, GLYPTA RUFISCUTELLARIS CRESS.

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In 1935, the writer published a preliminary paper on some alternative hosts of oriental fruit moth parasites, in which *Glypta rufiscutellaris* Cress. was recorded from an unknown leaf-tier on hawthorn in 1934. This species has since been identified by Dr. J. H. McDunnough as *Epinotia* sp., presumably *laracana* Kft. In the summer of 1935, *G. rufiscutellaris* was again reared from this host and an attempt was made to induce the emergents to parasitize oriental fruit moth larvae. Unfortunately, all but a single unfertilized female were destroyed by ants, but the survivor successfully parasitized newly hatched fruit moth larvae which were exposed in the cage on July 20 and 21, 12 male *Glypta* emerging from this material on August 19 to 25.

The final proof of the identity of the race from *Epinotia* with that from the ragweed borer (*Epiblema strenuana* Walk.) and oriental fruit moth, would be the crossing of the two races, but the fact that the *Epinotia* strain will parasitize the fruit moth, together with their morphological identity, would seem to indicate that they are the same.

The collections of *Epinotia* made in 1935 showed a parasitism of 20 per cent by *Glypta rufiscutellaris*, the latter emerging from June 29 to July 9. In 1934 emergence occurred from June 19 to 23. Further collections were made in 1936 and 1937, but no parasites were reared from them. A survey of the distribution of *Epinotia* in the Niagara fruit belt has shown that it is largely confined to an area of about five miles in diameter in the vicinity of St. Davids. Traces of the leaf-tier were found through the greater part of the eastern end of the Niagara Peninsula, but it appeared to be entirely absent from the western portion.

The oak leaf roller, *Argyrotoxa semipurpurana* Kft., from which *G. rufiscutellaris* was also reared in 1934 has since been exceedingly scarce and no material could be obtained for further study. While these two hosts (*Epinotia* and *Argyrotoxa*) of the spring generation of *Glypta* are too scarce or local to be of much practical importance, they do indicate that such a generation exists, the most important hosts of which have not yet been discovered. Rice (1935) has shown that the adults of *Glypta* emerging from *Epiblema strenuana* in the spring may live long enough under favourable conditions to parasitize second brood fruit moth larvae, but it scarcely seems possible that such survivors could produce the very high parasitism that is often found. At Vineland Station, Ont., the spring emergence of *Glypta* from the ragweed borer took place from May 8 to 24 in 1935, and May 4 to 14 in 1936, while second brood oriental fruit moth larvae usually do not appear until about the end of the first week of July. The next brood of *Glypta* from the ragweed borer do not emerge until much later, August 12 to September 18 in 1935, and August 17 to September 10 in 1936.

A few incidental notes were made on the life history of *Epinotia laracana* (?). The moth emerged very early in the spring, on March 22 in 1935 and April 15 in 1936, these being the first days in their respective years when the temperature reached 60°F. In the former year, young larvae were found in the swelling buds of hawthorn on May 2 and matured early in June, spinning paper-like cocoons in the soil and pupating in the fall.

The ragweed borer has been generally abundant through the Niagaara Peninsula during the years 1934 to 1937, with only minor fluctuations in abundance. Parasitism by Glypta in 1935 was 23 and 15 percent on the spring and first generations respectively, and in 1936, 21 and 9 percent. *Macrocentrus delicatus* Cress. was somewhat less abundant than *Glypta* on overwintering generation of the borer, but much more so on the first. Only two specimens of *Macrocentrus ancylivorus* Roh. were recovered, one from each generation. *Cremastus minor* Cush. was a common parasite of both generations, but only one specimen of *Cremastus forbesii* Weed was recovered. All of the foregoing species are fruit moth parasites of varying importance. Other species, not known to attack the fruit moth, which have been consistently reared in considerable numbers from both generations of the ragweed borer are *Epiurus pterophori* Ashm., *Cremastus epagoges* Cush., *Microbracon* sp. near *caulicola* Gahan, and *Bassus simillimus* Cress. *Eurytoma tylodermatis* Ashm. and *Perilampus fulvicornis* Ashm. were also commonly found in the tunnels of the borer, but were possibly secondaries attacking some of the other parasites. The spring generation of borers and parasites were reared from ragweed placed in exposed gauze cages, and the first generation from stems kept in jars of water in the insectary.

In addition to the hosts of *Glypta rufiscutellaris* mentioned in this and the previous paper of the writer, the species has been reared from the following in 1935 and 1936: *Epiblema scudderiana* Clem, a gall-former on stems of goldenrod; *Epiblema obfuscana* Dyar, boring in stems of goldenrod; *Melissopus latiferreanus* Wlshm, in acorns of red oak. The parasites were determined by Mr. G. S. Walley but they have not been reared on the fruit moth. Both the hosts and parasites were too scarce to have any influence on the *Glypta* population of peach orchards.

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Rice, Paul L. (1935) Notes on the ragweed borer (*Epiblema strenuana* Walshm.) and its parasites. Trans. Peninsula Hort. Soc., 1935, in Bull. State Board Agric. (Delaware) 25 (5) : 89-94.

SOME APPARENTLY NEW EUCOSMIDAE (LEPID.)*

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Genus *Polychrosis*

In the course of my studies of the Eucosmids of Nova Scotia I find that there are several species in the *spiraeifoliana* group which, while very similar in general appearance and maculation, can be readily separated on characters found

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in the female genitalia and to a lesser extent also in those of the male. Mr. C. Heinrich in his Monograph has figured the female genitalia of *spiraeifoliana* Heinr. and *aemulana* Heinr. and these figures, while rather reduced in size, are quite recognizable. Both species occur in southwestern Nova Scotia and along with them are two other species, apparently undescribed. I offer descriptions of these, together with figures of the female genital plates of all four species for the sake of comparison.

Polychrosis palliolana n. sp.

Female. Head and thorax clothed with light tawny scales. Primaries with the maculation much as in *spiraeifoliana;* the pale antemedian band, however, which separates the dark basal and median areas, is decidedly paler than in any of the allied species and stands out quite strongly with a slight silvery tinge. The median band is dark with only a very moderate amount of tawny scaling; on the other hand the dark streaks and spots of the outer half of wing are almost entirely covered with tawny scaling. The round silvery spot in the outer angle of the median band is quite prominent. There is a dark line at the base of the shiny leaden-colored fringes. Secondaries entirely deep smoky with whitish fringes cut by a dark basal line. Genital plate hood-shaped (fig. d).

Male. What I take to be this sex is very similar to the female, showing the same pale antemedian band and dark hindwings. As, however, without breeding, an association of sexes is somewhat uncertain I am basing the description on the female. The genitalia are very similar to those of *spiraeifoliana* and *aemulana* but the aedeagus, although pointed apically, shows neither lateral nor terminal teeth or spines; the two small bunches of spines beneath the apex of the much reduced uncus are wanting. Expanse 10 mm.

Holotype—♀, S. Milford, N. S., June 25, 1934, (J. McDunnough); No. 4319 in the Canadian National Collection, Ottawa.

Allotype—♂, same data, June 22.

Paratypes—1 ♂, 1 ♀, same data, June 29, July 7; 2 ♀, White Point Beach, July 16, 17, 1934 (J. McDunnough); 1 ♀, Kazubazua, Que., June 10, 1927, (F. P. Ide); 1 ♀, Mer Bleue, Ottawa, Ont., May 7, 1928, (W. J. Brown).

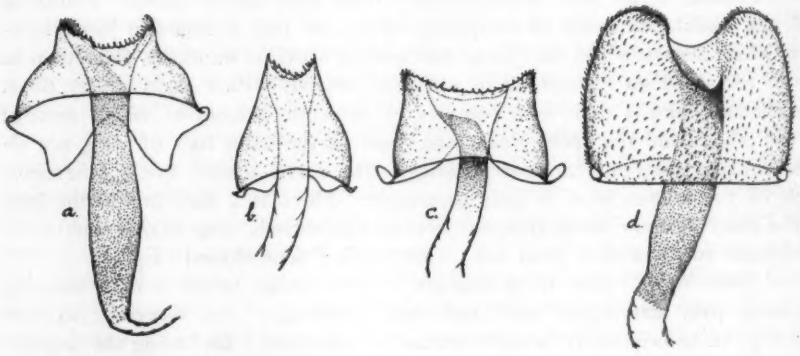
Polychrosis exasperana n. sp.

Female. Scarcely to be distinguished from *spiraeifoliana* except on genitalic characters. In the maculation of forewing the antemedian band is rather pale on its inner half, the median dark band is scaled with pale-tawny in the lower portion but below costa is without such scaling and consequently darker; tawny scaling present on outer half of wing. The hindwings are noticeably paler towards base of wing. In the genitalia (fig. c) the plate is rectangular, much broader than high, and the opening of the ductus occupies roughly the central half of the width, whereas in *spiraeifoliana* the plate is conical, higher than broad, and the ductus-opening occupies the entire width of apical portion. Expanse 10 mm.

Holotype—♀, S. Milford, N. S., June 25, 1934, (J. McDunnough); No. No. 4320 in the Canadian National Collection, Ottawa.

Paratypes—2 ♀, same data, June 23, 30, 1934; 1 ♀, Petite Riviere, N. S., July 16, 1935, (J. McDunnough).

Two males from Petite Riviere may prove to belong to this species. Their genitalia are very similar to those of *spiraeifoliana* but the aedeagus shows two lateral teeth, rather widely spaced and somewhat larger than those found in *spiraeifoliana;* as, however, the number of lateral teeth is apparently rather variable in this species I am uncertain about the correct association until breeding can be done. Several more rubbed females before me from Petite Riviere, N. S. also belong here according to genitalia but are too poor to include in the type series.



Female genitalia of *a. Polychrosis aemulana* Heinr.; *b. P. spiraeifoliana* Heinr.; *c. P. exasperana* n. sp.; *d. P. palliolana* n. sp.

From small, dirty green larvae, collected in the immature flower-heads of *Spiraea* at Petite Riviere in July, I bred a long series of specimens which agreed with captured specimens from Knowlton, Que. found flying around *Spiraea.* These had been tentatively identified for me by C. Heinrich as *P. artemesiana* Zell., a European species. On comparison with Kennel's figures I find the Nova Scotia species shows more resemblance in color to *bicinctana* Dup. than to *artemesiana* and, in view of the difference in larval food-plant from either of these European species, I believe I am justified in describing the species as new.

Polychrosis spiraeae n. sp.

Plate 7, fig. 1.

Palpi, head and collar ochre-brown. Thorax deep purple-brown, the patagia suffused with ochre-brown. Abdomen black-brown. Primaries with basal area deep purple-brown, the outer margin of this area angled inward at costa, otherwise perpendicular to inner margin of wing. Bordering this dark area outwardly is a broad creamy band, shading gradually outwardly into the golden-brown color of the remainder of the wing. More or less connected but very indistinctly defined dark patches at end of cell and before anal angle, the latter narrowly shaded outwardly with creamy. Three pale creamy geminate streaks between mid-costa and apex, the two streaks of each pair being separated by a dark hair-line; the first and third pairs give rise to oblique purplish metallic streaks, the outer of which extends to outer margin of wing; between first and second pairs is a small dark patch on costa and similar patches extend around apex of wing and are continued down outer margin by an obsolescent dark hair-

line. Along inner margin the median light brown area shows fine black dots. Fringes blackish at base, slightly purplish metallic in outer portion, cut faintly by ochreous scaling below apex and at anal angle. Secondaries deep smoky with whitish fringes, cut at base by a smoky line. Expanse 8.5-10 mm.

Holotype—♂, Petite Riviere, N. S., Aug. 10, 1935, (bred from *Spiraea*), (J. McDunnough); No. 4301 in the Canadian National Collection, Ottawa.

Allotype—♀, same data.

Paratypes—8♂, 13♀, same data, all bred from *Spiraea* on various dates from Aug. 1-15.

Aphania bifida n. sp.

Palpi, head and thorax deep brown, the latter lightly frosted with whitish scaling and with a strong red-brown posterior dorsal tuft. Forewing with basal two-thirds deep brown with only faint indication of white shading (much less than in *capreana* and *youngi*); this consists of fine geminate streaks along costa from the median pair of which faint sprinkling is continued obliquely across wing; a few white scales near base of wing and along outer portion of dark area serve to accentuate some deep black transversely elongate patches. The outer margin of the dark area is very similar to that of *youngi*, forming a very obtuse angle opposite cell with a faint indication of a comma-like indentation and then evenly oblique to inner margin just before tornus. Outer third of wing white with apex of wing narrowly dark brown, this area extended down outer margin to near tornus as a narrow brown line. A faint narrow grayish band (due to heavy white sprinkling over a dark ground-color) extends irregularly upward from tornus, forking opposite cell but not attaining costa; the subapical bar is more distinct than this band, due to less white scaling, and shows as a rectangular brown patch below apex, joined to outer margin by a narrow dark line and to costa by a still fainter grayish line. Fringes smoky with dark basal line except at tornus where they are white. Secondaries deep smoky; fringes white with dark basal line. Expanse 17 mm.

Holotype—♂, Mer Bleue, Ottawa, Ont., July 22, 1936, (W. J. Brown); No. 1421 in the Canadian National Collection, Ottawa.

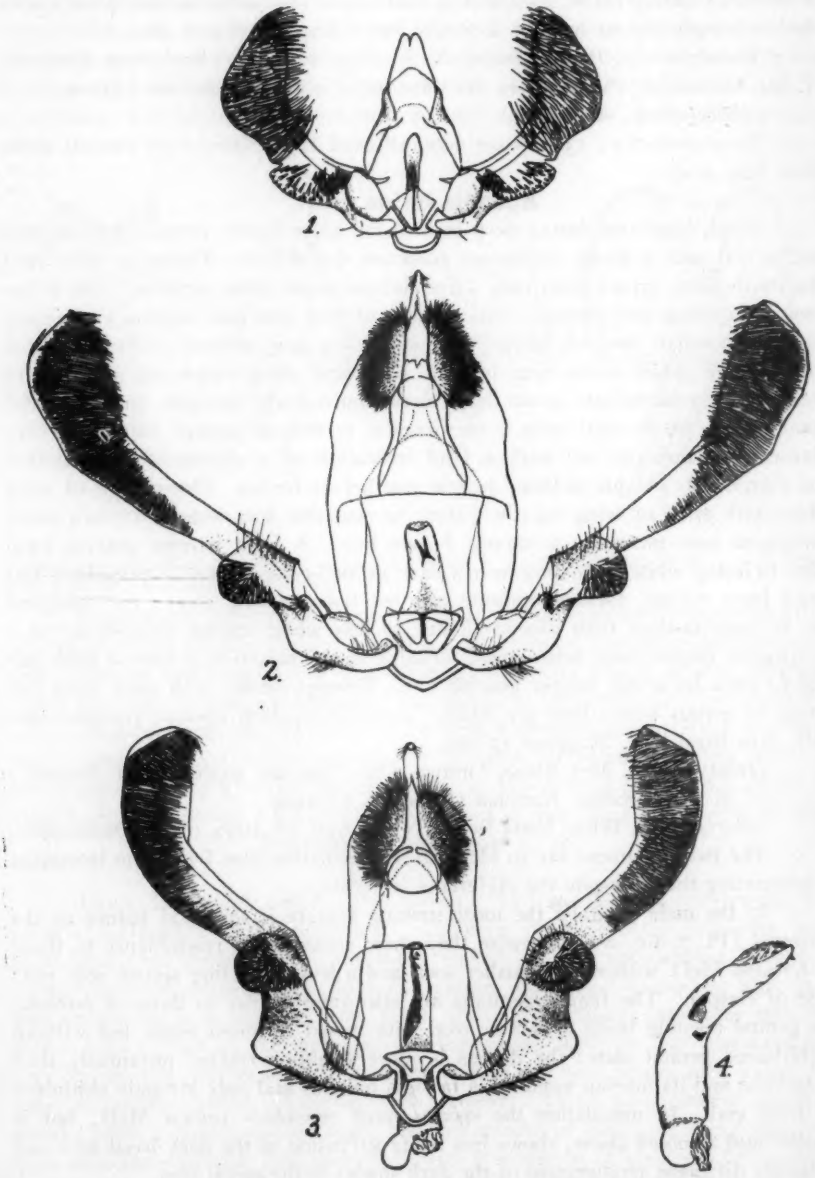
Allotype—♀, White Point Beach, N. S., Aug. 16, 1936, (J. McDunnough).

The two specimens are so identical in maculation that I have no hesitation in associating them, despite the difference in locality.

In the male genitalia the most striking feature is the bifid nature of the cornutus (Pl. 7, fig. 2); otherwise they show considerable resemblance to those of *tertiana* McD. with rather smaller socii and a less projecting spined area near base of clasper. The female genitalia are also quite similar to those of *tertiana*, the genital opening being a narrow oval with raised chitinous edges but without a chitinized genital plate; the ductus is more weakly wrinkled proximally than in *tertiana* and its median swelling is far less bulbous and only strongly chitinized at distal end. In maculation the species most resembles *youngi* McD., but is smaller and as noted above, shows less white suffusion in the dark basal area and a slightly different arrangement of the dark shades in the apical area.

Aphania spinulana n. sp.

Very similar to *frigidana* Pack. which occurs in the same locality, but with the primaries slightly less elongate and with heavier dark shading in the apical



Male Genitalia of 1. *Polychrosis spiraeae* n. sp.; 2. *Aphania bifida* n. sp.; 3. *Aphania spinulana* n. sp.; 4, Aedeagus of *Aphania brevicornuta* n. sp.

area; the genitalia (Pl. 7, fig. 3) are quite distinct.

Palpi deep purple brown with considerable white scaling on second joint laterally and largely white underneath; third joint blackish. Head and thorax deep purple-brown with an admixture of white scaling, notably on the front and the patagia; dorsal tuft tinged with brown. Primaries with basal two-thirds deep purplish, very moderately shaded with white scaling, and with small scattered black patches, faintly relieved by brown; the first main group of such black scaling forms an indistinct outwardly oblique antemedian band, descending to vein 1 and preceded and followed by considerable white scaling in costal region; a larger group occurs near the outer margin of the dark area, extending broadly and irregularly from mid-costa to vein 1 and particularly prominent in the region of the white comma-mark to be mentioned later. Outer third of wing white with three small costal patches, an apical area descending along outer margin and a narrow subapical oblique bar, brown, the latter at times largely hidden by the white scaling; the outer margin of the dark area descends, slightly inwardly oblique, from the inner side of first costal patch to mid-wing where a narrow indentation of white forms a distinct comma-mark (narrower than the corresponding mark in *frigidana* and more as in *capreana*); below this strongly and irregularly bulging to tornus with a distinct small, round, black spot on outer side of the white comma; from tornus a grayish streak (due to white scaling over dark ground-color) extends obliquely and irregularly upward to the subcostal area and similar fainter streaks extend from the outer costal patches towards subapical bar; this latter shows two superimposed, small black patches, the upper of which may be extended inward to form a bar or be broken into 2 or 3 spots; a small brown scale-tuft on inner margin near base of wing. Fringes leaden, white at tornus. Secondaries deep smoky; fringes dirty white with dark basal line. Expanse 15 mm.

Holotype—♂, Churchill, Man., July 4, 1937, (W. J. Brown); No. 4337 in the Canadian National Collection, Ottawa.

Allotype—♀, same data.

Paratypes—10♂, 3♀, same locality and collector (June 15, 17, 23, July 4, 9, 1937).

A worn male from Artillery Lake, Great Slave Lake Region, July 13, 1924, (J. Russell) has been in the collection for some time but is not made a paratype due to condition.

The species is at once characterized in the male genitalia (Pl. 7, fig. 3) by the presence of a group of small spines near the apex of the aedeagus, as well as by the single long cornutus.

Aphania brevicornutana n. sp.

Scarcely distinguishable from the preceding except on genitalic characters. In the white terminal area the subapical bar is almost obliterated by white scaling and is only represented by several black dots; the gray streak from tornus is fainter and narrower and the brown costal patches much reduced; the brown shading, however, along outer margin remains. In the male genitalia the characteristic features are found in the aedeagus (Pl. 7, fig. 4) which has *a short stout cornutus* and a small subrectangular piece of chitin; apparently only a

single terminal spine is present, although this latter feature may not prove to be constant when more material can be examined. Expanse 15 mm.

Holotype—♂, Bonne Esperance, Que. Labr., July 14, 1929, (W. J. Brown); No 4338 in the Canadian National Collection, Ottawa.

Petrova pallipennis n. sp.

Palpi light ochreous with slight tawny tinges outwardly. Head, collar and basal portions of patagia light tawny; thorax deep purple-brown; abdomen scaled with silvery white. Primaries in the holotype male (a somewhat rubbed specimen) with basal two-thirds deep purple brown with no very definite maculation but slightly and indefinitely strigate with whitish; in the allotype female (a very perfect specimen) this dark area is divided into three by two dull silvery bands, the antemedian one being more or less upright, and the median (or outer) one strongly angled outwardly in lower portion of cell; in consequence of this angulation the outer portion of the dark area tends to form a small rectangular costal patch, considerably tinged with tawny, and a much larger inner patch broadening towards inner margin and based on same. The outer third of wing is heavily shaded with tawny. In the male again this area is not very definitely divided into patches but shows pale shading bordering the dark basal portion and traces of a subterminal silvery line; in the female the pale silvery bands are much more distinct and the tawny area is divided off into a large patch below costa, joined to tornus by a thin stalk, and further tawny shading at apex of wing and along outer margin. A blackish terminal line and smoky fringes, slightly paler basally. Secondaries *in both sexes* white, with faint sprinkling of smoky around apex of wing. Expanse 17 mm.

Holotype—♂, Kazubazua, Que., June 7, 1927, (F. P. Ide); No. 4322 in the Canadian National Collection, Ottawa.

Allotype—♀, same locality, June 10, 1935, (T. N. Freeman).

Paratypes—3♀, same locality as Allotypes, June 11, 1935, (T. N. Freeman and G. S. Walley); 1♀, Wright, Que., June 11, 1935, (F. A. Urquhart); 1♂, Tyrile, Man., June 9, 1929, (H. J. Brodie); 1♂, Nordegg, Alta., June 28, 1937, (K. Bowman), this specimen returned to the collector. One ♀ Paratype will also be deposited in the United States National Museum.

The species is readily recognized by the pale hindwings in both sexes. Two of the female paratypes agree with the holotype in maculation, the other one shows more definition of the banding as mentioned above for the Allotype. The male genitalia (Pl. 8, fig. 1) are quite similar to those of *gemistrigulana* Kft., but the claspers are shorter and chunkier and there is no indentation on the ventral margin before the cucullus.

Thiodia fasciculatana n. sp.

Male. Antennae distinctly fasciculate, banded with black and white. Palpi, head and thorax deep smoky, sprinkled with white; patagia white-tipped. Primaries brown with basal area, postmedian oblique band and a large patch below apex deeper brown; other areas of wing strongly strigate with white. The basal area is broad, occupying considerably more than one-third of the wing; it is sprinkled with white and appears to possess (the specimen is rubbed) white scaling along base of fold; its outer margin is oblique outwardly from costa to fold, then

almost perpendicular to inner margin with slight inward excavation on vein 1. This dark basal area is followed by a broad band, heavily sprinkled and strigate with white scales which almost form 3-4 vertical wavy lines; in course it is outwardly oblique to fold, then angled inward to inner margin. The postmedian dark band shows a sudden blunt projection on outer margin about middle of wing, below which it is almost cut in two by white scaling; in consequence it appears to consist of a long, costal, bluntly L-shaped portion and a smaller patch, based on inner margin before tornus. Along costa beyond postmedian band the usual four pairs of white dashes are not very conspicuous; they are separated by brown triangular patches, the inner two and the outer one sending silvery streaks inward toward the ocellus, which first partially encircle the large deep brown circular patch below apex of wing. Ocellus rather improminent, defined by two irregularly vertical silvery streaks, and containing, besides some white scaling, an upper black bar, a lower black spot and some black spots between, the distribution of this black scaling being probably variable. Fringes deep brown, tipped with white and with indications of a fine white basal line. Secondaries smoky. Fringes smoky, cut by a fine pale line near base. Expanse 19 mm.

Female. Smaller and chunkier in wing shape than male. Antennae simple. Color of both primaries and secondaries deeper brown. Expanse 18 mm.

Holotype— ♂, Shingle Cr., Penticton, B. C., May 16, 1936, (A. N. Gartrell); No. 4329 in the Canadian National Collection, Ottawa.

Allotype— ♀, same data.

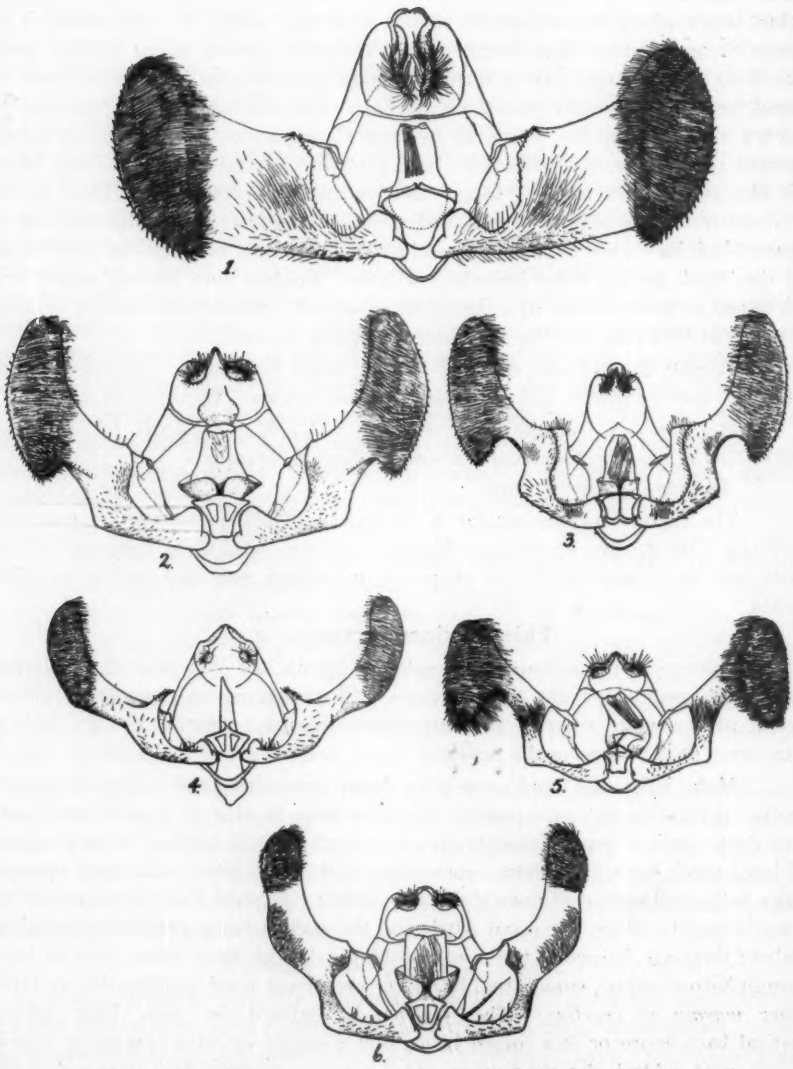
The species is quite similar to *modernana* McD. in maculation and male genitalia (Pl. 8, fig. 2) differs, however, in the fasciculate antennae of the male, and also somewhat in the shape of the median pale and postmedian dark bands.

Thiodia sinestrigana n. sp.

Belongs in the *marmontana—alterana* group and with scarcely differentiable male genitalia from these species. Characterized by the much greater extent of the white areas in the outer two-thirds of primaries and the lack of transverse dark strigae in the ocellus.

Male. Palpi and head deep gray, front somewhat paler. Thorax purple-brown, patagia tipped with paler. Primaries with basal 1/3 of wing and costal area deep purplish brown, slightly sprinkled with whitish scaling. Outer margin of basal patch inwardly oblique from below dark costal area, with slight outward bulge below cell and small inward angle on vein 1. Beyond this the balance of the wing is largely white, the usual patch and the ocellus being practically fused together; there are, however, traces of an oblique darkish band from costa to inner margin before tornus, emphasized by rather prominent *black spotting before lower inner margin of ocellus*. The ocellus is defined by two faint silvery vertical bars, more or less joined below and contains *no dark transverse streaks* but at most a black dot near upper outer corner. Several dark dots are visible along inner margin of wing. Costal dark area not sharply defined inwardly, containing in outer half four pairs of improminent pale streaks, the outer two of which are more or less joined by faint silvery lines. Slight light brown streaking before and at apex of wing. Outer margin, except at tornus narrowly purple-

CAN. ENT. VOL. LXX. PLATE 8



Male Genitalia of 1. *Petrova pallipennis* n. sp.; 2. *Thiodia fasciculatana* n. sp.; 3. *Thiodia sinestrigana* n. sp.; 4. *Thiodia alatana* n. sp.; 5. *Thiodia spectana* n. sp.; 6. *Thiodia crassana* n. sp.

brown; fringes concolorous, with slight admixture of white scaling. Secondaries light smoky at apex and along outer margin, considerably paler in basal half of wing. Fringes dull whitish with dark smoky basal line.

Female. Considerably darker than male, the costal dark areas of primaries tending to spread inwardly at the expense of the white ones basad of ocellus. Secondaries uniformly deep smoky with dark fringes. Expanse, 13-15 mm.

Holotype—♂, White Point Beach, Queens Co., N. S., Aug. 15, 1936, (J. McDunnough); No. 4325 in the Canadian National Collection, Ottawa.

Allotype—♀, same data.

Paratypes—12 ♂, 18 ♀, same locality and collector, taken in 1935 and 1936 on various dates from Aug. 14-29; 1 ♂, Petite Riviere, N. S., Aug. 13, 1936, (T. N. Freeman); one pair deposited in United States National Museum.

The species appears constantly different from its allies in the points italicized above. The type series was flushed from a thick growth of a small, narrow-leaved *Aster* species, which is probably the larval food-plant, as *alterana* Heinr. has been bred from *Aster lindleyanus* in southern Ontario. The distribution seems to be widespread as there is a small series of specimens before me from various points in Alberta and British Columbia which only differ in the somewhat larger size.

Thiodia crassana n. sp.

Palpi and head gray, the former contrastingly white beneath at base. Thorax deep gray with an admixture of white scaling on patagia. Primaries brown with a strong sprinkling of white scales in outer half. A prominent white streak along basal half of costa, and a second one of similar length from base of wing below cell, terminating pointedly, and continued by two fine parallel white lines to near inner margin of ocellus; some dark shading below this streak, particularly terminally. Ocellus white, defined by two vertical silvery streaks, curving together above tornus, and containing two prominent black transverse bars. Outer half of costa with a pair of well-defined oblique white dashes, followed by a gamma-like white mark with long oblique tail, a white semicircular mark and a triangular dash just before apex of wing and parallel to outer margin; these can become all more or less conjoined inwardly. Dark shading along inner margin except near base, relieved above by a certain amount of white scaling. Fringes prominently white at base, outer two-thirds smoky, with white sprinkling. Secondaries more or less uniformly smoky, veins 3 and 4 coincident. Fringes with dark basal line followed outwardly by a narrow pale line, the outer half being light smoky. Expanse 15-20 mm.

Holotoype—♂, Kreuger Mt., Osoyoos, B. C., May 9, 1936, (A. N. Gartrell); No. 4326 in the Canadian National Collection, Ottawa.

Allotype—♀, same data.

Paratypes—2 ♂, 2 ♀, same data; 1 ♂, 1 ♀, Shingle Cr., Penticton, B. C., May 12, 16, 1936, (A. N. Gartrell); 1 ♀, Brent's Lake, Penticton, B. C., May 12, 16, 1936, (A. N. Gartrell); one pair to be deposited in the United States National Museum.

The species is allied to *fertoriana* Heinr., especially in the similar type of fringes on primaries; the white markings in general, however, are much more prominent and the genitalia (Pl. 8, fig. 6) quite distinctive.

Thiodia alatana n. sp.

Male. Palpi and head deep gray with a certain admixture of white scaling. Thorax deep smoky, finely sprinkled with white scales. Primaries gray-brown, finely and evenly sprinkled with white scaling, most intensely in the area between ocellus and apex of wing.; ocellus the only prominent feature of the maculation, pale creamy with two dark transverse bars; no evident silvery defining streaks, a mere trace of the outer one being visible in upper portion. Costa faintly strigulate with dark in basal half; in outer half the usual four pairs of whitish oblique streaks are rather improminent and separated by dark shades; the apical pair are most evident and are more or less inwardly connected with the preceding pair. Fringes deep smoky, sprinkled with white scales and with a narrow but quite distinct white basal line. Secondaries dirty whitish with apex and outer margin narrowly tinged with smoky. Fringes pale with dark basal line. Expanse, 15 mm.

Holotype—♂, Kreuger Mt., Osoyoos, B. C., May 9, 1936, (A. N. Gartrell); No 4327 in the Canadian National Collection, Ottawa

The lack of maculation, apart from the ocellus and the white basal fringeline, distinguishes the species. In the genitalia (Pl. 8, fig. 4) the clasper shows a curious small wing-like projection near base below costa, which might be an enlarged transtilla.

Thiodia spectana n. sp.

Male. Palpi deep smoky, whitish beneath at extreme base; head slightly pale. Thorax smoky, heavily sprinkled with white. Primaries narrow, elongate, deep gray-brown heavily sprinkled with white scaling, especially in median area above inner margin. An inwardly oblique dark striga below cell at inner third but not attaining inner margin and defined outwardly by the above mentioned pale scaling; it shows faint fawn-brown shades in lower portion. Costa shows faint dark streaks in inner half; in outer half the four pairs of white streaks are separated by triangular brown patches, and are rather diffuse, more or less connected inwardly by silvery lines, and with some distinct fawn-brown shading between and below the individual streaks of each pair. Ocellus defined by two shiny white vertical bars, the inner of which is longer and much broader than the outer one; the area between these is light fawn-brown with two thin transverse black streaks. From the inner side of the first pair of white costal strigae, a faint oblique dark shade extends to the upper inner corner of the ocellus and is continued vertically to inner margin by faint diffuse dark shading on inner side of ocellus. Fringes an admixture of smoky and white scaling, tipped at and below apex with dark brown. Secondaries pale smoky. Fringes white with dark basal line and somewhat darker apices. Expanse, 14 mm.

Holotype—♂, Edmonton, Alta., Aug. 31, 1930, (K. Bowman); No. 4328 in the Canadian National Collection, Ottawa.

Paratypes—3♂, same locality and collector, Sept. 1, 1936; one of these in the Collection of Mr. K. Bowman and another to be deposited in the United States National Museum.

The male genitalia (Pl. 8, fig. 5) are very similar to those of *apacheana* Wlshm. but the species is narrower winged and with a much better defined ocellus. In maculation it is closely approached to *tenuiana* Wlshm. but is smaller and differs genitalically.

A NEW SPECIES OF NEMOBIUS FROM ONTARIO (ORTHOPTERA)

BY F. A. URQUHART,
Royal Ontario Museum of Zoology.

Nemobius macdunnoughi sp. n.

Size, medium; form slender. Head small but prominent; face shining piceous, the area below the eyes slightly lighter in colour; the occiput uniformly dark piceous, but distinctly trifasciate in one specimen; vertex with a number of long stout black bristles; the entire head clothed with short pale-coloured hairs. Eyes small, prominent and oval. Antennae uniformly dark fuscous. Maxillary palpi dark fuscous, the two terminal joints sometimes slightly paler. Pronotum uniformly shining piceous, sparsely covered with black bristles and densely clothed with pale-coloured hairs; anterior margin distinctly narrower than the posterior one, the latter about equal to the width of the head. Disk of pronotum with a distinct median depression. Tegmina of ♂ subequal in length to the abdomen and only slightly broader than the posterior margin of the pronotum; uniformly dark shining piceous; apex broadly rounded. Tegmina of ♀ subequal in length to the abdomen and equal in width to, or slightly narrower than the posterior margin of the pronotum; longitudinal veins pronounced; lateral margins of dorsal field yellowish-brown otherwise uniformly shining piceous; apex narrowly rounded. Wings (in macropterous individuals) twice the length of the abdomen. Legs fuscous, the femora and tibiae sometimes with distinct pale spots.

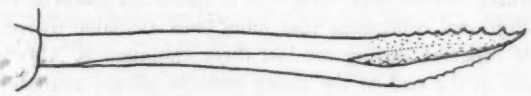


Fig. 1.—Ovipositor of *Nemobius macdunnoughi* n. sp. (x 24).

Spines of the hind tibiae fuscous at the base, the apex light yellowish-brown. Dorsal and ventral surfaces of the abdomen black, the latter sometimes slightly paler. Ovipositor dark reddish-brown or black, three-fifths the length of the hind femora; usually turned upwards at the base; dorsal margin usually straight, not conspicuously curved; upper margin of apical fifth with a row of irregularly spaced teeth, the lower margin with a row of minute teeth.

Length of body:—♂ 7.2-8.2 mm.; ♀ 6.6-7.2 mm. Pronotum—♂ 1.3 mm.; ♀ 1.5 mm. Tegmen:—♂ 4.8-5.1 mm.; ♀ 4.5-4.9 mm. Hind femur:—♂ 4.4-5.1 mm.; ♀ 4.9-5.1 mm. Ovipositor:—3.1 mm.

Holotype—♀, Hawthorn, Ontario, August 7, 1937 (F. A. Urquhart); No. 4363 in Canadian National Collection, Ottawa.

Allotype—♂, same data.

Paratypes—33 ♀s, 3 ♂s, same data; 8 ♀s in the Canadian National Collection, the balance in the Royal Ontario Museum of Zoology.

This species is very similar to *Nemobius carolinus* Scudder, from which it differs in the following respects: The antennae, head, pronotum and femora are black or dark fuscous, not brownish yellow as in *N. carolinus;* the maxillary palpi are black or dark fuscous the terminal joints rarely pale grayish-white; the tegmina are uniformly shining dark piceous, except in the females in which the lateral margins of the dorsal field may be light fuscous; longitudinal veins of female tegmina pronounced; dorsal surface of the abdominal black, that of the

female without four rows of small pale spots on the exposed portions, ventral surface dark fuscous; anterior margin of the pronotum distinctly narrower than the posterior margin; ovipositor not distinctly curved, the upper margin usually straight.

Little can be said concerning wing length since all of the specimens which I now have before me are macropterous.

The specimens were attracted to a light on the margin of a sphagnum bog in the vicinity of Hawthorn, Ontario. Thirty-eight specimens were taken, of which only four were males. Although I have not as yet located this species in the field still it may be assumed that its habitat is in the low ground bordering swamps, possibly retricted to sphagnum bogs.

I take great pleasure in dedicating this species to Dr. J. H. McDunnough to whom the author is indebted for his kind assistance and able guidance.

THE LAUXANIIDAE (DIPTERA) OF SOUTHERN QUEBEC AND ADJACENT REGIONS*.

BY G. E. SHEWELL,
Ottawa, Ont.

This treatment of the *Lauxaniidae* occurring in a somewhat limited faunal area is offered as an introduction to a more extensive study of the group which I hope to undertake before very long. It is based on material in a number of private and institutional collections that have been available to me as well as on my own material collected during the last three summers at Abbotsford, Quebec. The list of species at the end of the paper includes all the available data on their distribution in Canada. This information is based on my own examination of specimens and not on previous records, published or otherwise. Records of a number of species in the Quebec List of Diptera (21) are therefore no longer valid, since I have been able to examine all the specimens on which these records are based. Ten species are described as new, but there are one or two cases in which it is possible that synonymy may be established later. These are discussed in the appropriate places.

No discussion of the genus *Camptoprosopella* Hendel is offered in this paper, beyond its inclusion in the generic key. A preliminary examination of a large amount of North American material has shown that there are many species (nearly twenty) closely allied to *C. vulgaris* Fitch. These are apparently separable, for the most part, on superficial as well as genitalic characters. Thus, there is clearly the need for a complete revision of this genus and I intend to undertake this as a separate paper. The Southern Quebec region has two species, of which the male genitalia are illustrated herein (Plate V, Figs. 47-50.). Neither of these species has, so far, been found to be represented in material from New York, the type locality of Fitch's species.

It will be seen that a number of the type specimens have the genitalia mounted separately. This means that the dissected part is mounted in balsam

*Contribution from the Division of Entomology, (Systematic Entomology), Department of Agriculture, Ottawa. Rewritten from a M.Sc. thesis submitted to the Faculty of Graduate Studies and Research, McGill University.

between small glass covers on a card beneath the insect. There are no slide mounts of type material.

ACKNOWLEDGMENTS

I wish to thank Dr. Curran of the American Museum of Natural History for suggesting this study, and for being consistently generous with helpful advice and the loan of material, since its inception. My sincere thanks are also due to Rev. Bro. Jos. Ouellet of the Deaf and Dumb Institute, Montreal, M. Gustave Chagnon of the University of Montreal, and Mr. C. E. Petch of the Entomological Laboratory, Hemmingford, Quebec. All these placed their entire collections in this family at my disposal. Dr. McDunnough accorded me every facility for studying material in the National Collection, Ottawa, and Dr. Nathan Banks of the Museum of Comparative Zoology, Cambridge, Mass. lent me a male of *Homoneura conjuncta* Johnson, determined by Johnson.

HABITS OF THE ADULTS

Except for a single specimen of *Minettia lupulina* Fab. on sumac blossom, I have not taken any species of Lauxaniids at light nor on flowers, though Malloch and McAtee (18) have recorded a number of species taken in these ways. The flies are, for the most part, shade-loving and, except for one or two very common species, are not found far from a brook, stream or natural swamp. I have taken seventeen species, including all genera except *Camptoprosopella*, by sweeping clumps of basswood (*Tilia americana*) in half cleared maple bush. The flies rest in the dense shade on the underside of the large leaves of this plant. *Lauxania cylindricornis* Fab. and *Minettia* spp. of the group *obscura* Lw. are to be found frequently on sugar-maple saplings where these form dense thickets. Species of *Minettia* and *Homoneura* are sometimes to be taken on both pink and white spiraea (*Spiraea latifolia* and *S. tomentosa*) which grow in swampy ground especially in the late summer when the bloom is over. The two species of *Camptoprosopella* are not usually to be found with members of the other genera except *Homoneura*. They may be swept from rushes, vetches, willows and other low-growing foliage along the banks of rivers and streams where they are often very plentiful. According to its present generic limits, little or nothing is known of the immature stages and biology of this family.

INSTRUCTIONS FOR USE OF THE KEYS

As the numbers of genera and species in the region under consideration here, are small compared with those known even in just the Eastern part of the continent, I have thought it advisable in preparing the keys, to go into more detail, in some cases, than was necessary for the separation of the species, so that there could be little doubt of their identity, rather than to include in the keys species which had not been recorded, although they might reasonably be expected to occur. In the case of the key to the genera, these supplementary characters have been placed in brackets at the end of each couplet or part of a couplet. I hope that, in this way, an unrecorded genus or species will at once be recognized, in which case it can be traced further with the aid of Malloch and McAtee's paper, or with Curran's (6) key in the case of genera.

All of the previously described species treated in this paper are to be found also in Malloch's keys, but the elucidation of his species, *Homoneura citreifrons*, based on an excellent series collected last summer, separates it rather more clearly

from the species close to it.

I am afraid that students wishing to determine species accurately will have difficulty in doing so among the very similar forms of *Minettia* and *Sapromyza*. In spite of familiarity with these groups, I would still hesitate to distinguish between males of *M. americana* and *M. americanella* without making a dissection of the genitalia, although the difference is immediately clear when this is done. The important processes of the genital sternites in the males of this group are normally hidden by the anteriorly-directed superior forceps, and they are easily broken off or damaged when the genitalia are pulled backward to expose them, even though the specimen has been thoroughly relaxed. The male hypopygia of the members of the two groups of *Sapromyza*, on the other hand, often shrivel and collapse after pinning, so that the different parts lose their normal shape and also their proper positions in relation to each other. When this happens, only the process of dissection and liquid mounting will restore their normal shape and make it possible to determine the structure accurately. I mention this in order that the collector who regards with distaste or horror the idea of mutilating his specimens, may see that, in this case, he has a clear choice between doing so and leaving them incorrectly or only approximately determined.

I believe that the allocation of females with their respective males in the *Sapromyza* groups must, for the present, be only approximate according to general appearance and locality data. Exact determinations, based on the shape of the genital sternite, will be possible only when sufficient numbers of copulating pairs have been obtained. The females of the *Minettia* group have been allocated with the males partly by the evidence of copulation and partly by observations on locality. It may be found later that wrong associations have been made, but in any case it is probably justifiable to make them rather than to leave all females loose and unattached in collections.

The difficulty of determining females lies in the fact that the members of these groups, as well as species of other genera, live in such close association in nature, that the capture of two closely similar specimens of the opposite sex from the same bush in the same net is not proof of conspecificity.

KEY TO GENERA[4]

1. Antennae very long and slender, the first segment at least two-thirds as long as the second and with apical hairs below, the third segment cylindrical, much more than twice as long as wide; (arista with dense short hairs above and below; sternopleura with two strong bristles; face convex; shining black species) ..... *Lauxania* Latreille.
   Antennae not unusually elongate, the first segment much shorter than the second or without apical hairs below, the third segment rounded or oval, not more than twice as long as wide; (wing veins devoid of conspicuous setulae or hairs except on the costal margin.) 2
2. Anterior frontal bristles directed inward; first antennal segment as long as the second; (anterior frontals closer to upper frontals than to antennae; ocellars long and strong; face gently convex or plane; yellow species.) .... *Camptoprosopella* Hendel.

[4]Adapted from Malloch and McAtee (18), and Curran (6).

Anterior frontals reclinate; first antennal segment much shorter than second; (presutural bristle present; apical cell widely open) 3

3. Sternopleura with one bristle; (front not broader than long, not concave in front when viewed from above) ..... *Pseudogriphoneura* Hendel.
Sternopleura with two bristles, the anterior one the weaker; (face gently convex or plane, not polished) 4

4. Intra-alar bristle present; (scutellum bare above; frontal bristles not arising from tubercles) ..... *Minettia* Robineau-Desvoidy
Intra-alar bristle absent; (second vein not undulate) 5

5. The minute black costal setulae continued to apex of third vein ..... *Homoneura* Van der Wulp
The black costal setulae extend to only a little beyond apex of second vein, never to third ..... *Sapromyza* Fallen

Lauxania Latreille

There is but a single representative of this genus recorded from Eastern Canada, *Lauxania cylindricornis* Fabr. It is a common and widely distributed fly, shining black in color, the wings with luteous tinge. It is easily distinguished from other members of the family by its very long, slender antennae. The male genitalia show wide individual variation, especially in the shape of the superior forceps. Some of these types I have figured (Fig. 53 a-f). The females, on the other hand, show two structural types of genitalia which are apparently very constant. In one type, the genital sternite is broad and spatulate and truncated posteriorly, and in the other, it is much narrower and ends in a point.

Pseudogriphoneura Hendel

P. gracilipes Loew (Fig. 54) is the only species of this genus in this region. It is not scarce, but not especially abundant. I have taken it in numbers from basswood leaves in shady places. It is a rather pretty fly, mostly shining black; the tibiae and tarsi pale grayish white and contrasting strongly with the rest of the body coloration; dorsum of thorax brownish pruinescent; thoracic pleura and parafacials silvery grayish pollinose; face glossy black; arista long plumose above; halteres pale brownish yellow; wings with luteous tinge; length about 4 mms.

Minettia Robineau-Desvoidy

KEY TO SPECIES

1. Knobs of halteres yellowish 2
Knobs of halteres black, thorax and abdomen black 4

2. Thorax black, densely cinereous pollinose 3
Head, thorax, abdomen and legs entirely yellowish testaceous; face with a central velvety black spot on the oral margin: 7th abdominal tergite of male with a central dark spot; hair and bristles black; wings with a luteous tinge; small species (2.5 mm. Fig. 15) ..... *puncticeps* Coquillett

3. Margin of scutellum sooty black; hind femora, apical half of middle femora, middle and hind tibiae yellowish testaceous; frons with a broad white band on anterior margin above antennae; rather large species (4-5 mms. Figs. 13, 14) ..... *lupulina* Fabricius
Margin of scutellum not sooty black; mesonotal hairs strong and rather sparse; middle and hind femora and tibiae mostly black, the femora slightly gray pruinescent; abdomen yellowish testaceous; frons not with broad white band

anteriorly; smaller species (3-3.5 mms.) ..... *cana* Melander

4. The forked process of the genital sternite of the male (8th abdominal sternum) is curved forward, away from the superior forceps, its extremities normally entirely visible in lateral view; genital stenite (8th visible abdominal sternum) of female with two deep depressions in its surface 5

   The forked process of the male genital sternite is curved backward towards the superior forceps, its extremities normally concealed by the latter in lateral view (Figs. 10, 11); genital sternite of female subquadrate, its surface entirely convex (Fig. 12) ..... *lyraformis* n. sp.

5. The prongs of the forked process of the male genital sternite not noticeably wider at their base than at the tips in ventral view; the postero-lateral corners of the genital sternite not projecting beyond the middle of the superior forceps in lateral view; female genital sternite without colorless, membranous lobes laterally 6

   Prongs of the forked process much wider at their base than at the tips in ventral view; the genital sternite long, its posterolateral corners projecting nearly to the end of the superior forceps in lateral view, (Figs. 7, 8); genital sternite of female with two large colorless lobes arising from the pleural membrane and concealing its lateral edges (Fig. 9) ..... *lobata* n. sp.

6. Posterior edges of the superior forceps of male not reflexed; lateral edges of 8th tergite of male lobate (Figs 1, 2); female genital sternite as in Fig. 3 ..... *americana* Malloch

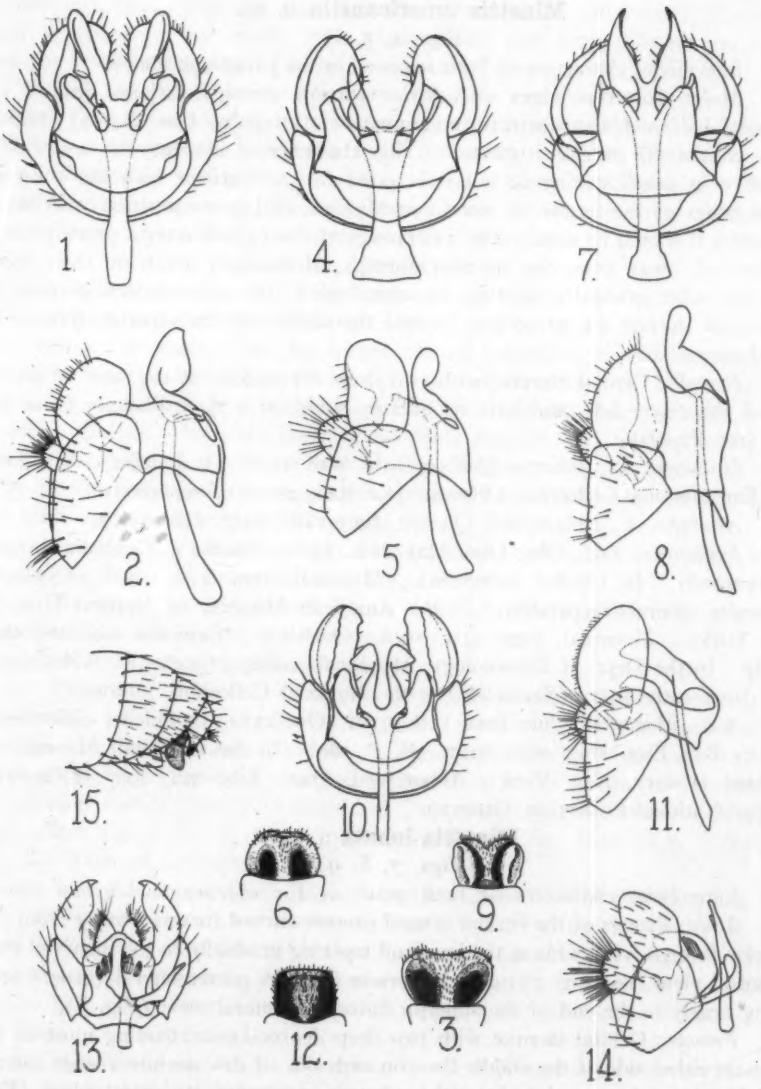
   Posterior edges of superior forceps of male strongly reflexed inwards on the basal half; lateral edges of 8th tergite of male truncate (Figs. 4, 5); female genital sternite as in Fig. 6 ..... *americanella* n. sp.

Group *Minettia obscura* Loew.

This group contains a number of forms which are inseparable except on the basis of the genital structures. These, however, are so distinct and so free from individual variation and intergradation that the forms must be given specific status. The only other American species described in this group, besides Loew's species is *americana* Malloch. Its author separated it from *obscura* on the basis of the number of dorsocentral bristles (4 pairs for *americana* and 3 for *obscura*). My material does not entirely bear out this distinction, for I have series of the species in this group, including *americana*, which contain specimens having either 3 or 4 pairs of dorsocentrals, the presutural pair being sometimes as strong as those behind it, sometimes much weaker and sometimes entirely absent.

The chief characters common to all members of this group are as follows:—Ground color of head, thorax, and abdomen black; frons opaque, centrally faintly brownish pruinose elsewhere grayish pruinose, on the ocellar triangle and at the bases of the frontal bristles more distinctly shining, anterior margin reddish; two black stripes extending laterally from the antennal bases to the eyes; face, especially the parafacials, silvery pollinose; genal and occipital regions grayish pruinose; mouthparts shining black; antennae opaque, deep fuscous or black, except the bases of the arista and third segment which are reddish brown, arista short plumose, third segment oval, twice as long as wide; thorax more or less opaque, faintly gray pruinose, a median vitta and two lateral vittae on the lines of the dorsocentrals more distinctly pruinose; humeri rather bare and shining; abdomen

CAN. ENT. VOL. LXX. PLATE 9



LAUXANIIDAE OF SOUTHERN QUEBEC

shining black, including genitalia; legs shining black, except the middle and hind tarsi which are yellowish testaceous; preapical dorsal bristles usually absent from hind tibiae, when present, they are very small; wings with a luteous tinge, blackened at the bases; knobs of halteres black, the stalks brownish or yellowish testaceous; all bristles and hairs on body and legs black; length 3-4 mms.

Minettia americanella n. sp.

(Figs. 4, 5, 6)

Superficial characters of both sexes as in the paragraph above.

Male: Posterior edges of superior forceps strongly reflexed inward on the basal half and also distinctly emarginate at this point (see Fig. 4); lateral edges on the 8th tergite truncate. (This character is not easy to see and is deceptive in dried specimens, but it is good for comparison with the rounded lateral edges of the tergite in *americana* Malloch, and in conjunction with other characters it should be used. Fig. 5); prongs of the forked ventral process curved forward, away from the superior forceps, of uniform width on their basal half, thereafter gradually tapering, in ventral view; the posterolateral corners of the genital sternite not projecting beyond the middle of the superior forceps in lateral view.

Female: Genital sternite with two deep depressions at the base on either side of the centre line, and with its greatest width at a short distance from the base (see Fig. 6).

Holotype, ♂, Joliette, Quebec, July 16th 1918, (J. Ouellet), No. 4261 Canadian National Collection, Ottawa. (Genitalia mounted separately).

Allotype, ♀, Abbotsford, Quebec, June 14th, 1937, (Shewell).

Paratypes, ♂ ♂, Oka, Que. May 24th, 1921. (Ouellet) (Genitalia mounted separately. In Ouellet collection). Montreal, June 21st, 1918, (Ouellet). (Genitalia mounted separately. In the American Museum of Natural History, New York). Montreal, June 21st, 1918 (Ouellet). (Genitalia mounted separately. In the Dept. of Entomology, Macdonald college, Quebec). Abbotsford, Que. June 14th, 1937, (Shewell) (In the National Collection, Ottawa).

♀ ♀, Montreal, Que. June 11th 1919 (Ouellet). (In Ouellet collection). Miner's Bay, Ont. May 26th, 1927, (F. P. Ide), (In the American Museum of National History, New York). Abbotsford, Que., June 4th, 1937, (Shewell) (In the National Collection, Ottawa).

Minettia lobata n. sp.

(Figs. 7, 8, 9)

Superficial characters of both sexes as for *obscura* Lw. group above.

Male: Prongs of the forked ventral process curved forward, away from the superior forceps, very wide at the base and tapering gradually to the incurved tips, in ventral view (see Fig. 7); genital sternite long, its posterolateral corners projecting nearly to the end of the superior forceps in lateral view (Fig. 8).

Female: Genital sternite with two deep depressions extending most of its length on either side of the middle line; on each side of this sternite a large colorless lobe of membrane arises from the pleuron, concealing its lateral edges (Fig. 9).

Holotype, ♀, Fairy Lake, near Hull, Quebec, June 6th, 1927, (G. S. Walley), No. 4259 Canadian National Collection, Ottawa.

Allotype, ♂, same data as holotype. (Types separated while in copula).

Paratypes, ♂ ♂, Abbotsford, Quebec, June 14th, 1937, (Shewell) (In Ouellet Collection); Joliette, Que., July 16th, 1918, (Ouellet) (Genitalia mounted separately. In the American Museum of Natural History). Abbotsford, Quebec, May 31, 1937. (In the Dept. of Entomology, Macdonald College, Que.). Abbotsford, Que., June 4th, 1937, (In the Entomological Laboratory, Hemmingford Quebec). Four males from Abbotsford, one from Outremont, Que., and one from Jordan, Ont., (in the National Collection).

♀ ♀, Montreal, June 11th, 1919, (Ouellet) (In Ouellet Collection). Ste. Hilaire, Que., June 22nd, 1919, (Ouellet). (In the American Museum of Natural History). Abbotsford, June 14th, 1937, (Shewell). (In the Dept. of Entomology, Macdonald College). Abbotsford, June 4th, 1937, (Shewell). (In the Entomological Laboratory, Hemmingford, Que.). Also two from Abbotsford and one from Covey Hill, Que. in the Ottawa Collection.

Minettia lyraformis n. sp.

(Figs. 10, 11, 12)

Superficial characters as above.

Male: In lateral view, the forked ventral process is curved backward and normally the tips are concealed between the superior forceps (Fig. 11). In ventral view, the prongs curve outward from the base and then gradually inward again to the tips which are enlarged suddenly laterally, the whole process suggesting the shape of a lyre, for which reason I have given this species its name. The anterior edges of the superior forceps are quite distinctly serrate, unlike the other species of the group (Fig. 10).

Female: The genital sternite is subquadrate in outline and more or less evenly convex on its entire surface (Fig. 12).

Holotype, ♂, Abbotsford, Que., June 14th, 1937, (Shewell) No. 4260, Canadian National Collection, Ottawa.

Allotype, ♀, same data as holotype.

Paratypes, ♂ ♂, Ile d'oil, Que. June 28th, 1932, (Ouellet) (In Ouellet Collection). Joliette, Que., July 7th, 1917, (Ouellet). (Genitalia mounted separately. In the American Museum of Natural History). Montreal, May 21st, 1918. (Ouellet) (Genitalia mounted separately. In the Dept, of Entomology, Macdonald college Que.). Abbotsford, Que., June 1937, (Shewell); Muskoka, Ont. June 1925, (H. S. Parish); Niagara Glen, Ont., June 1926, (Walley). (In the National Collection).

♀ ♀, LaTrappe, Que., July 4th, 1935, (Leopold). (In the American Museum of Natural History). Montreal, August 1932, (In the University of Montreal Collection). Hemmingford, Que., July 2nd, 1922, (C. E. Petch). (In the Entomological Laboratory, Hemmingford). Abbotsford, May 18th, (Shewell); Sully, Que., June 21st, (Ouellet); LaTrappe, Que., July 4th, (Leopold). (In the National Collection).

Minettia obscura Lw., according to the evidence afforded by Malloch's (18) figure of the male genitalia, has not been found in this region. It is possible, however, that one of the species described above will be found to be the same as Loew's species, and it is almost certain that these new species are at present contained in many collections under the names *obscura* or *americana*.

All are apparently fairly common and widely distributed and live in close association with each other in nature.

(to be continued)

NEWS AND VIEWS

PRACTICAL CONTROL FOR EUROPEAN CORN BORER ON EARLY MARKET SWEET CORN.

A recent press release from the United States Department of Agriculture informs us that a practical way to control the European corn borer on early market sweet corn has been found after years of work by State and Federal entomologists.

Recent tests by entomologists of the U. S. Department of Agriculture and the Connecticut Agricultural Experiment Station show that several compounds are effective and practical in saving sweet corn, particularly the early varieties that bring prices high enough to justify the extra expense of using the insecticides. Whether or not these insecticides can ever be recommended for borer control on canning corn and field corn depends on the results of tests now in progress.

The promising new borer insecticides are: (1) Nicotine tannate solutions prepared from nicotine, a common insecticidal material, and Chinese gallo-tannin, an easily available form of tannic acid; (2) derris sprays, made from the ground roots of a plant imported from the Far East in large quantities for the insecticide industry; (3) phenothiazine (a compound of sulphur and a commercially available dye intermediate) spray: and (4) nicotine dust, a mixture of nicotine tannate powder and powdered nicotine bentonite (a compound of nicotine and common clay). None of these preparations come ready mixed and the mixing of some of them is rather complicated, the entomologists say.

The nicotine tannate solutions have been found most dependable in the Department's tests. Detailed directions for preparing and using the new insecticides may be obtained from the Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture, Washington, D. C. and from the Connecticut Agricultural Experiment Station, at Storrs.

Time is important in using corn borer insecticides. They must be applied during the comparatively brief period the caterpillar spends on the outside of the plant. In eastern Connecticut this usually is between June 10 and 30. The first hatching of the egg masses is the signal to start spraying or dusting. The applications must cover the leaves, emerging tassel, developing ear, junction of leaf blades with stem, and tiller growth.

Mailed Saturday, June 4th, 1938.

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The Canadian Entomologist

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THE LAUXANIIDAE (DIPTERA) OF SOUTHERN QUEBEC AND ADJACENT REGIONS.

BY G. E. SHEWELL.
Ottawa, Ont.

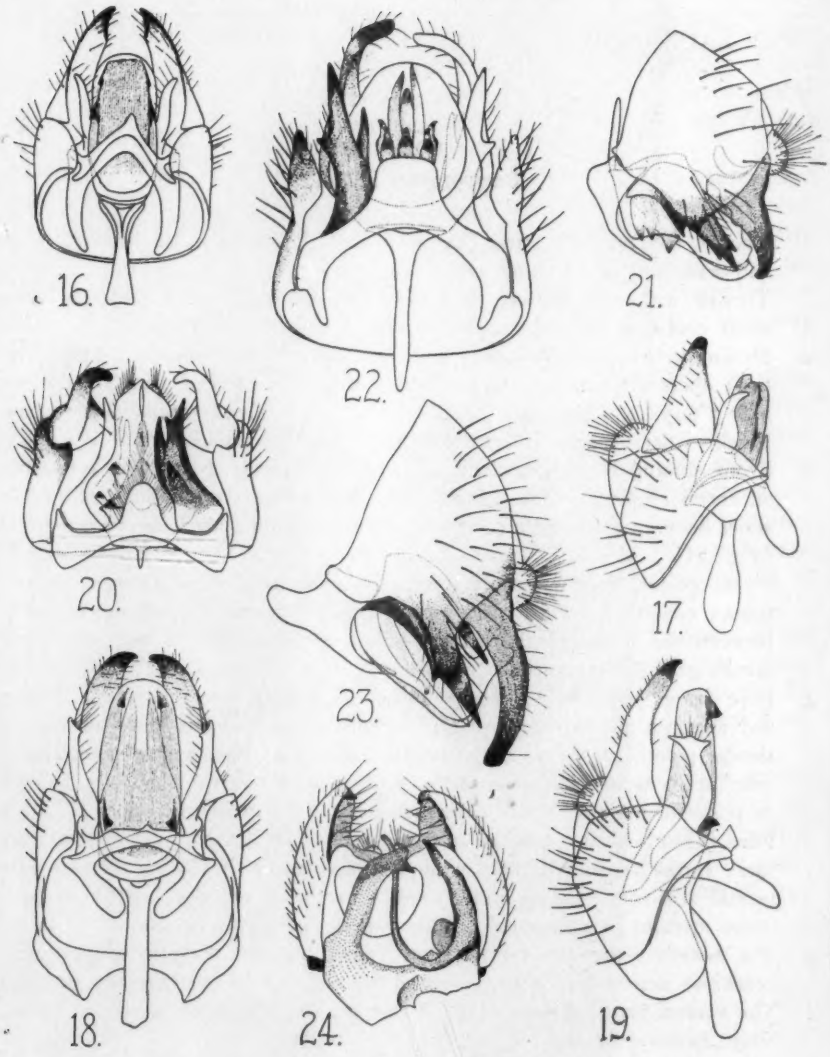
(continued from page 110)

Sapromyza Fallen.

KEY TO SPECIES.

1. Thorax without dark vittae just mesad of the dorsocentral bristles; frons and scutellum also lacking dark vittae 2
   Thorax with two distinct dark vittae mesad of the dorsocentrals, these vittae continued onto the scutellum; frons with similar vittae 4
2. Shining yellow species; thorax with two pairs of dorsocentrals; wings hyaline; abdomen with a round shining black spot on each side of the last 2 or 3 tergites. (Fig. 24) ..... *rotundicornis* Loew.
   Black or dark species; thorax with three pairs of dorsocentrals 3
3. Frons shining black, especially on orbits, conspicuously reddish testaceous on anterior margin; thorax faintly gray pruinescent; the acrosticals in four series between anterior dorsocentals; abdomen shining black; arista pubescent (Fig. 33) ..... *hyalinata* Meigen.
   Frons opaque, brownish-pruinescent, indistinctly reddish on anterior margin; thorax opaque, brownish pruinescent, two light grayish pruinescent vittae between the dorsocentrals and the acrosticals, the latter in two rows; abdomen grayish pruinescent; arista nearly bare (Fig. 34) .... *fusca* n. sp.
4. Fore femur without a comb-like series of minute setulae between middle and apex on anteroventral surface; eighth abdominal tergite of male with slender pointed processes on its lateral edges or at least with distinct angularity at its posterolateral corners; male genital structures robust; bristles on posterior margins of abdominal tergites not set in fuscous spots 5
   Fore femur with a comb-like series of minute setulae on anteroventral surface; eighth tergite of male without processes on its lateral edges; male genital structures usually quite small, if rather large, the bristles on posterior margins of abdominal tergites are set in fuscous spots 9
5. The heavily chitinized ventral plate behind the 5th sternite of the male bears two slender backwardly-directed processes on its posterior margin .. 6
   The ventral plate behind the 5th sternite of the male bears a central broad, blunt, backwardly-directed process on its posterior margin 7
6. Superior forceps of male hypopygium long, not very slender, inner margins on apical third serrate, from base to tip more or less evenly curved forward and inward beneath the other structures, tips rounded, almost entire outer surfaces shining black ..... *serrata* Malloch
   Superior forceps of male hypopygium shorter, rather evenly tapering, inner margins not serrate but with a distinct angle at the distal third, not evenly

CAN. ENT. VOL. LXX. PLATE 10



LAUXANIIDAE OF SOUTHERN QUEBEC

curved forward and inward, only the tips rather abruptly curved, outer surfaces shining black only towards the tips (Figs. 31, 32) .. *currani* n. sp.

7. Eighth tergite of male with slender pointed processes at its posterolateral angles 8
Eighth tergite of male without slender processes, but with distinct angularity at these points (Figs 20, 21) ..... *aspinosa* n. sp.

8. Superior forceps of male hypopygium short, stout, much shorter than the 8th tergite measured opposite their bases, coarsely serrate at the tips (Figs. 29, 30) ..... *subserrata* n. sp.
Superior forceps of male hypopygium very long and slender, as long as the 8th tergite measured opposite their bases, blunt at the tips, not serrate (Figs. 22, 23) .... *novaescotiae* n. sp.

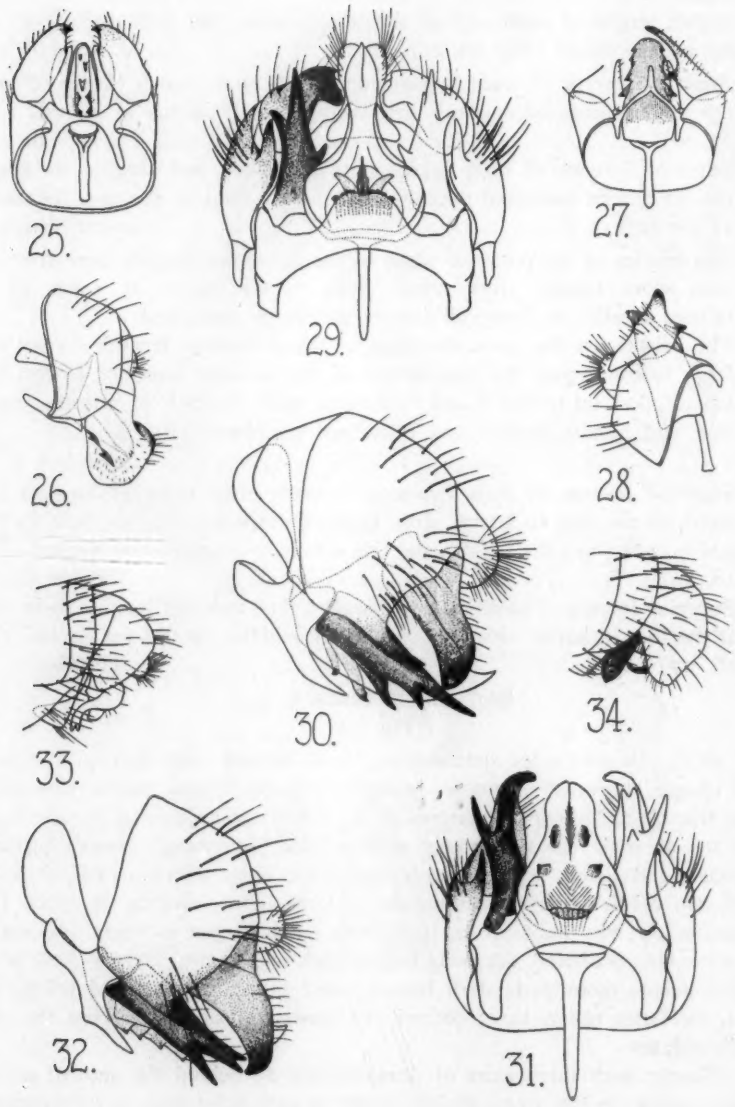
9. The bristles on the posterior edges of the abdominal tergites arise from fuscous spots, usually other small spots at the bases of some of the bristles anterior to them; all femora and tibiae maculated 10
The bristles on the posterior edges of the abdominal tergites do not arise from fuscous spots, the maculations of the abdomen confined to two large lateral spots on tergite 2 and four large spots on each of tergites 3 to 6; fore and middle femora and tibiae not maculated (Fig. 25, 26) .... *spatulata* n. sp.

10. Superior forceps of male hypopygium more than twice as long as their width at the base in lateral view, gradually tapering, slightly bent forward and inward from the middle, the tips distinctly incurved and hooked (Figs. 18, 19) ..... *browni* Curran.
Superior forceps of male hypopygium less than twice as long as their width at the base in lateral view, not bent in the middle, the tips not hooked (Fig. 16, 17) ..... *ouelleti* n. sp.

Sapromyza fusca n. sp.
(Fig. 34)

Male: Ground color dark brown; head broader than thorax at humeri; frons opaque, brownish pruinose, especially on the frontal plates, around the ocellar triangle and along the margins of the eyes grayish pruinose in some lights, above the antennal bases narrowly reddish; face retreating, grayish pruinose, parafacials and cheeks with a silvery sheen, the latter about one-third the eye height, two reddish brown lines appear in some lights, dividing the face from the parafacials; two dark brown bars from antennal pits to eyes; oral margin quite noticeably produced, narrowly dull reddish on the rim; clypeus dark brown and prominent; mouthparts dark brown, palpi black; antenna and arista dark brown, the latter nearly bare; occiput gray pruinose, silvery between the paracephalic sutures.

Thorax with three pairs of dorsocentrals all behind the suture; acrostical hairs strong, in two rows, slightly closer to each other than to dorsocentrals; coloration as follows; anteriorly, including the humeri, between the acrostical and dorsocentral row on each side, on the disk of the scutellum, and on the pleura gray (very faintly brownish) pruinose, elsewhere brownish pruinose, halteres brownish, the knobs subshining. Abdomen grayish pruinose including


25.
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genital segments; eighth abdominal tergite not very large, its posterolateral corners normally directed downward, rounded, without processes; cerci very small, not visible in lateral view; superior forceps very small, also normally concealed, consisting of two shining black, closely appressed, anteriorly curved processes; penis entirely chitinous, dark brown (See Fig. 34). Legs uniformly dark brown, the femora distinctly, the tibiae faintly grayish pruinose; middle and hind tarsi slightly paler but not yellow.

Wings a little more than twice the length of the abdomen, faintly luteous, the bases reddish brown, the veins dark brown. Length 3½-4 mms.

Female: Differs only sexually.

Holotype, ♂, Hemmingford, Que., March 17th, 1927, (G. H. Hammond). The specimen was labelled *S. brachysoma* Coq. and was lent to me by Dr. Curran. It seems unlikely to be *brachysoma*, differing, as it does, quite radically from Coquillett's description of that species[1]. Type returned to Dr. Curran.

Allotype, ♀, Wabamun, Alta., May 8th, 1932, (E. H. Strickland), No. 4298, Canadian National Collection, Ottawa.

Paratypes, ♂ ♂, Edmonton, Alta., May 16th, 1924, May 19th, 1937, (E. H. Strickland). ♀, Brockville, Ontario, Oct. 29th, 1903, (W. Metcalfe), all in the National Collection.

Group *Sapromyza annulata* Melander

Comb of setulae present on the fore femora; male hypopygium small or of medium size.

Sapromyza ouelleti n. sp.

(Figs. 16, 17)

The frontal and thoracic vittae, maculations of the abdomen and legs and other superficial characters are the same as in *browni* Curr. (See Curran's description (5)). Male genital structures of medium size, the eighth tergite very similar in size and shape to *browni*, without processes on its lateral edges; the superior forceps about one-third shorter than in *browni*, less than twice as long as their basal width, when viewed laterally, normally not with a slight bend forward in the middle, though often becoming curved and buckled forward and inward in dried specimens, the tips not hooked; inferior forceps curved anteriorly towards the apex, broadest at the base, their sides not parallel, with a distinct, bristle-bearing angle near the base anteriorly; the proximal pair of chitinous hooks on the ventral surface of the penis distinctly more than half way from its base.

Holotype, ♂, Sully, Que., June 24th, 1936, (J. Ouellet). (Genitalia mounted separately), No. 4253, Canadian National Collection, Ottawa.

Allotype, ♀, Same locality, July 1st, 1936, in the Canadian National Collection.

Paratypes, ♂ ♂, Harrington Harbor, Que., July 4th, 1929, (W. J. Brown). (In Ouellet Collection). Agassiz, B. C. (Genitalia mounted separately. In the American Museum of Natural History). Lethbridge, Alta., June 7th, 1927, (H. E. Gray). (In the Dept. of Entomology, Macdonald College, Que.). Kazubazua, Que., Aug. 17th, (G. S. Walley); Kaslo, B. C. May 19th, (A. A.

(1) Canadian Entomologist, Vol. 30, p. 278, 1898.

Dennys); Salmon Arm, B. C., June 17th, (A. A. Dennys) (in the National Collection). ♀ ♀, Sully, Que., June 27th, 1936, (J. Ouellet) (In Ouellet Collection). Sully, Que., June 26th, 1936, (J. Ouellet). (In the American Museum of Natural History). Sully, Que., July 1st, 9th and 12th, 1936, (J. Ouellet), also one copulating pair from Sully (in the National Collection).

Note: In *browni* Curr., the posterior productions at the tips of the inferior forceps may sometimes be greatly elongated so that this structure appears the same as in *annulata* Mel. Similarly, there is sometimes a distinct angularity or slight process on the posterior edge of the same structure in *ouelleti*, near the apex, making it appear similar to *browni*. In these cases, the evidence of the shape of the superior forceps and penis must be considered as these structures appear to be very constant.

Sapromyza spatulata n. sp.

(Fig. 25, 26)

Male: Ground color of head yellow, cinereous pollinose, more bluish pollinose on the ocellar triangle and lines joining the frontal and median vertical bristles, between the frontal bristles brownish yellow; the ferrugineous-yellow median vittae rather indistinct; a large crescent-shaped or subtriangular yellow area on the front above the antennal bases; cheeks with a brownish bar from the ventral edge of the eyes to the oral margin; proboscis and palpi pale reddish yellow; antennae yellow, arista brownish. Thorax distinctly and uniformly pale bluish pollinose as in *pictiventris* Mall., this blue tinge much more evident than in *browni* and *ouelleti;* the four thoracic vittae dark brown, almost blackish, the median pair evanescent before reaching the scutellum; disk of scutellum concolorous with the thorax, the median thoracic vittae continued on it rather faintly, its edge yellow; four pairs of dorsocentrals; acrostical hairs in four rows.

Abdomen pale yellow, faintly cinereous pollinose; second segment with two large lateral brownish spots, third to sixth segments each with four large spots.

Hypopygium small; superior forceps short, spatulate, the tips slightly incurved and bearing three or four minute teeth; penis and inferior forceps normally concealed, the latter thin, bladelike. Legs uniformly pale yellowish, the tips of the posterior femora anteriorly with a small brownish spot; squamae and halteres pale yellowish; wings without luteous tinge; length 2.5 mms.

Female: Unknown.

Type, ♂, Abbotsford, Que., June 2nd, 1937, (Shewell), No. 4254, Canadian National Collection Ottawa.

Paratypes, four ♂ ♂, June 4th, 1937, same locality. (One with genitalia mounted separately. One paratype deposited in the American Museum of Natural History, New York, and one in the Entomology Department, Macdonald College, Que.).

Group *Sapromyza quadrilineata* Loew.

Fore femora without the comb of setulae; hypopygium large.

Sapromyza aspinosa n. sp.

(Figs. 20, 21)

Male: Ground color of head pale yellowish testaceous; front cinereous pollinose, the bluish tinge distinct, laterally along the margins of the eyes silvery white pollinose, the median vittae dark brown and broad, anterior edge above the

antennal bases sometimes yellowish; face faintly cinereous pollinose, latero-ventrally grayish, the parafacials silvery white pollinose; cheeks with dark brown spots between the eyes and oral margin; proboscis brownish yellow; palpi dark brown; antennae pale yellowish testaceous, arista slightly darker. Thorax cinereous pollinose, the four thoracic vittae dark brown, rather narrow, the median pair more or less evanescent at the acrostical bristles; acrostical hairs in two complete median rows and an incomplete row on either side of these; disk of scutellum concolorous with thorax, the edge pale sand-colored, vittae on the scutellum narrow, convergent posteriorly. Abdomen pale yellowish, maculations as in *spatulata;* eighth tergite without slender pointed processes laterally but with distinct angularity at these points; superior forceps rather short, slender at the tips which are abruptly curved inward; inferior forceps cleft towards apices, the lateral arms twice as long and strong as the mesal ones and bearing small processes half-way along on their mesal surfaces, two small processes on the ventral surfaces at the bases of the main arms; penis towards its tip half as wide as at its widest point in ventral view. Legs pale yellowish, the tibiae narrowly banded with dark brown just beyond the basal third. Halteres whitish yellow. Wings with faint luteous tinge. Length 3 mms.

Female: Differs only sexually.

Holotype, ♂, LaTrappe, Que., May 30th, 1936, (J. Ouellet). (Genitalia mounted separately) No. 4255, Canadian National Collection, Ottawa.

Allotype, ♀, same data.

Paratypes, Two ♂ ♂, four ♀ ♀, same data.

Sapromyza subserrata n. sp.

(Figs. 29, 30)

Male and female: Coloration of head, thorax and legs and maculations of abdomen identical with those given for *spatulata*, except that in this species, the median thoracic vittae are usually somewhat broadened posteriorly and extend to the margin of the scutellum. The vittae on the scutellum are also broad and approximate. Length 3-3½ mms. Male hypopygium very large; the ventral plate with a broad blunt central process; eighth tergite with slender pointed processes on the posterolateral angles; superior forceps short, stout, the tips coarsely serrate; inferior forceps not cleft at apices, with stout central arms and two much smaller arms, a mesoventral one at the basal third and a lateroventral one at the distal third; penis abruptly constricted in the middle and pointed at the tip in ventral view.

Holotype, ♂, Abbotsford, Que., June 14th, 1937, (Shewell) No. 4256, Canadian National Collection, Ottawa.

Allotype, ♀, same data.

Paratypes, Three ♂ ♂, one ♀. Same data as types, also specimens of both sexes from LaTrappe, Covey Hill, Fairy Lake (nr. Hull), Que., and Norway Pt., Lake of Bays and Ottawa, Ontario. (Two with genitalia mounted separately. In the Canadian National Collection); Three ♂ ♂, three ♀ ♀, Lauzon and LaTrappe, Que., (J. Ouellet) (In Ouellet Collection); ♂, Abbotsford, June 11th, 1937, (Shewell) ♀, Ottawa, May 29th, 1925, (Curran) (In the American Museum of Natural History); Three ♂ ♂, three ♀ ♀, same data as types (One of each sex in the Dept. of Entomology, Macdonald College, Que., in the collection of the

University of Montreal and in the Entomological Laboratory, Hemmingford, Que.).

Note: The above species bears a superficial resemblance to *serrata* Malloch in its genital and other characters. The points of difference are that, in Malloch's species, the ventral plate bears two slender processes somewhat similar to the same structure in *currani* (Fig. 31), the processes of the eighth tergite arise from the anterolateral corners, the superior forceps are longer and almost entirely shining black, the inferior forceps are cleft towards the apices, the arms dissimilar in length but equal in thickness.

Sapromyza currani n. sp.

(Figs. 31, 32)

Male: The unique type of this species is in too poor condition for an accurate description of the body coloration, but the pattern of the head, which is undamaged, the maculations of the legs and the genital structures, place it undoubtedly in this group, with close superficial resemblance to the above two species. Ventral plate of the hypopygium with two slender processes posteriorly; eighth tergite with pointed processes posterolaterally; superior forceps not serrate, rather evenly tapering, angulate at the distal third on the inner (posterior) margins, the tips abruptly incurved and blackened; inferior forceps cleft towards apices, the arms similar in length, the mesal arms more than twice as thick as the lateral ones and notched at their apices, two small processes arising on the ventral sides at the bases of the main arms; penis towards its tip nearly half as wide as at its widest point in ventral view. Length 3 mms.

Type, ♂, Aylmer, Que., July 18th, 1924. Collected by Dr. Curran. (Genitalia mounted separately). No. 4257, Canadian National Collection, Ottawa.

Sapromyza novaescotiae n. sp.

(Figs. 22, 23)

Male: The unique type of this species is also in poor condition, but the superficial characters are apparently similar in every respect to the other species of the group. Ventral plate with a central broad, blunt, posterior process; processes at the posterolateral corners of the eighth tergite robust, blunt and nodulate at the tips; superior forceps very unusually long and slender, as long as the eighth tergite measured opposite their bases, blunt at the tips, not serrate; inferior forceps cleft at about half-way, the lateroventral arms more than twice as long and strong as the mesodorsal ones and bearing small processes on their lateroventral surfaces at the base; penis in ventral view nearly as broad as long, broadly rounded at the tip, not at all constricted in the middle. Length 3.5 mms.

Type, ♂, Kentville, N. S., July 8th, 1923, (R. P. Gorham), No 4258, Canadian National Collection, Ottawa. (Genitalia mounted separately).

(to be continued)

NEW CHRYSOPIDAE AND SPECIES NEW TO THE UNITED STATES.

BY NATHAN BANKS,
Cambridge, Mass.

In identifying Chrysopidae from the South and West I have come across some new species, a few specimens have been in the collection for years, but more specimens have shown their distinctness. Correction is made of a misidentifica-

tion in my Revision of the *Chrysopidae* and three Cuban forms have been taken in Florida.

A few years ago I realized that the number of cubital cross-veins beyond the divisory veinlet was fairly constant in each species: in our common *Ch. oculata* I have found it more constant than the shape of the divisory cell. In *oculata* and many of our species there are six cubitals; seven in *nigricornis, majuscula* and *chi* (*ypsilon*); eight to ten in *robustus* and *gravida*. The length of the hair on the veins is also useful; in *oculata* very long, in *nigricornis, majuscula, coloradensis* very short.

The width of the postcubital area compared to the cubital is a valuable character, in some as *apache,* and *comanche* it is hardly broader than the cubital area; in most species much broader, in *furcata* almost twice as broad.

A curious venational character in Chrysopa is the fact that from the third cubital cell there goes two veinlets to the hind margin, while the fourth has but one, yet the fifth and sixth two each. Variations are rare, and in a South American species of which I have a dozen or more specimens the third cubital has but one branch, while the fourth, like those beyond, has two.

Chrysopa comanche sp. nov.

This is the form of *C. plorabunda* group that occurs in the southern part of Texas, New Mexico, Arizona, and California. The very narrow wings are acute at tip, the venation wholly green, the face with a red mark each side under the eye, but in two lines divergent above, and the inner one extending up to inner edge of the eyes. Sometimes there is a dot or line of reddish each side on vertex by the eyes. The divisory veinlet ends before the cross-vein above, six cubital cross-veins beyond it, ten to eleven radial cross-veins, and only about five or six free branches to the radial sector, gradates about four and six in subparallel series. The post-cubital area is only a little broader than the cubital, thus the cells there are mostly not twice as high as long, the veinlets but little oblique; hair on veins moderately short.

Length of fore wing 11 to 12 mm.

From Laredo, Texas, others from Roswell, New Mexico; Yuma, Arizona; Prescott N. For., Arizona 20 June, and Los Angeles, California. Others are from other places in the same general area. Holotype M. C. Z. No. 23181 from Laredo, paratypes in Ohio State Mus. and M. C. Z.

It differs from *C. plorabunda* in lacking the black on the cheeks, in more narrow postcubital area, in shorter hairs on veins, etc. From *C. harrisi* in having the red on cheek divided and one part going up by side of eye, in less elongate wings and less oblique veins, with much fewer free branches of radial sector. *C. externa* Hagen was described from Washington, D. C., California, and Mexico. None of the types exist; I have therefore selected a neotype from the Eastern form, a specimen from Winter Park Florida, 31 Oct., where it is very common. This form sometimes has a red mark on the anterior lateral margin of pronotum. It differs from *C. comanche,* in broader wings, broader post cubital area, and the red on cheeks is one large spot, not divided, and only below the eye, just as in *C. harrisi,* and Hagen suggested it might be that species, which was then unknown to him. I and others have previously identified western specimens

of *C. comanche* as *C. externa*, but since there are three or more Western forms which have this type of divisory veinlet, I think it is best to keep *C. externa* for the eastern form and which fits his description.

Chrysopa mohave sp. nov.

Head pale greenish, cheeks with two reddish lines united below (much as in *furcata* but not black); rest of body, antennae, and legs pale, unmarked, palpi pale, no dark marks; basal joint of antennae short and strongly convex on inner side; pronotum about as long as broad, somewhat narrowed in front. Wings with mostly greenish venation, the gradates and several cross-veins toward base dark, the inner ends of many costals, and each end of the radial and cubital cross-veins dark, also the base of radial sector; stigma pale greenish; in the hind wings the venation greenish, but gradates and ends of some of the cross-veins as in fore wing are faintly dark.

Fore wings rounded at tip, hind wings hardly pointed; both rather slender. In fore wings the divisory veinlet ends a little beyond the cross-vein above, six-cross-veins beyond the divisory; third cubital cell rather broad, two branches to hind margin, and one from the next cell; post-cubital space not twice as wide as cubital space; seven or eight gradates in two parallel series, inner about one-half way between outer and radial sector; hairs on veins moderately long.

In hind wings three or four gradates in inner row and five or six in outer row, nine radial cross-veins. Hind tibiae very long and slender, not at all swollen.

Length of fore wing—13 mm.

From Claremont and Stanford Univ., Calif. and Chiricahua Mts. Ariz, (Beamer coll). Holotype M. C. Z. No. 23182; Paratypes in R. C. Smith coll. and M. C. Z.

Differs from *furcata* in unmarked palpi, and especially in the shape of the basal joint of antennae, in *furcata* these are long, the sides nearly parallel, not swollen on inner side; also in *furcata* the hind tibiae are plainly swollen.

Chrysopa apache sp. nov.

Head pale; a curved dark band above the clypeus, a dark brown spot between the antennae, and a red or brownish triangle more or less evident on the vertex; palpi marked with black; antennae with the basal joint pale, with a dark stripe on the outer side, rest of antennae black or dark toward tip; pronotum twice as broad as long, a broad dark stripe on each lateral margin; mesonotum with a large dark spot above base of fore wings; abdomen dark, with some pale spots above; legs pale, mid and hind femora with a broad dark band, the tibiae narrowly dark at base and tip.

Wings with largely black or dark venation, the subcosta for most of length, the radial sector, and most of medius and cubitus dark; radius pale, and some pale on cubitus and anals toward base; stigma slender, yellowish; in hind wings veins mostly dark, but paler than fore wings. stigma pale. Wings rather slender, tips pointed. In fore wings nine radial cross-veins; divisory cell long and ends a little beyond the cross-vein above; third cubital cell longer than second and rather broad, two branches to the hind margin, and one from the next cell; six cubital cross-veins beyond the divisory; two or three inner gradates, five or six outer ones, in parallel rows, and inner one nearer to outer than to radial sector;

post-cubital space hardly any broader than the cubital area; hair on veins quite short hardly noticeable.

In hind wings eight radial cross-veins; two or three inner and four or five outer gradates; hind tibia long, very slightly swollen, nearly twice as long as the mid tibia.

Length of fore wing 12 mm.

From Globe, Ariz. 27 June (Parker), Davis Mts., Texas 2 June (J. N. Knull), Palmerlee, Ariz (Biederman), and 25 miles from Sells, Ariz. (Painter).

Holotype M. C. Z. No. 23183 from Globe; paratypes in Prof. R. C. Smith's coll., Ohio State Mus. and M. C. Z.

There are now five species in this section of those with some longitudinal veins partly black.

They can be tabulated as follows:—

1. Antennae black near base 2
   Antennae wholly pale 3
2. Subcosta, radius, and most of radial sector pale; seven cross-veins beyond divisory ..... *nanina.*
   Subcosta and radial sector dark; six cross-veins beyond end of divisory veinlet ..... *apache.*
3. Two submedian dark stripes on pronotum, extending back over mesonotum; radial sector and gradates dark; six cubital cross-veins beyond divisory .... *luctuosa.*
   Pronotum with broad marginal dark stripes; radial sector largely pale 4
4. Body broad and stout; most of cubital and radial cross-veins dark in middle; nine cubitals beyond the divisory; palpi largely pale ..... *gravida.*
   Body normally slender; cubital, radial, and gradates all pale; seven cubital cross-veins beyond divisory; palpi almost wholly black ..... *schwarzi.*

Chrysopa thoracica Walk.

This belongs to the *rufilabris* group, antennae pale, and veins partly dark, but sometimes there is very little dark. Venation much as in *rufilabris;* it is a stouter species, with broader pronotum; it lacks the red under eye that is found in *rufilabris*, but has more or less plainly in fresh specimens two transverse reddish bands across the face; the palpi are not marked with black (with black in *rufilabris*).

The wings are rather broader than in *rufilabris,* especially the southern form of *rufilabris* known as *attenuata.* The species is common in Porto Rico, and Hispaniola, less common in Cuba. Mr. G. B. Fairchild collected several specimens at Coconut Grove, Florida, in May and June.

Chrysopa cubana Hagen.

Hagen recorded this species from Virginia in his original description; his specimens were lost. We have one from North Carolina and several from Little River, Florida (Moznette). It has the basal part of antennae dark, except the basal joint which is pale, but has a distinct dark stripe on the outer side. The cross-veins are largely dark; the two rows of gradates, about five and eight, are parallel and close together; the divisory veinlet ends beyond the cross-vein above, and six cross-veins beyond it; the post-cubital area not one-half wider than the cubital area. The pronotum is hardly as long as broad, and often has a reddish stripe near the margin.

Chrysopa cubana var. **sanchezi** Navas.

This differs from the type in lacking the dark stripe on the basal joint, and this joint as well as the space above it is of a yellowish or rufous color. As in typical *cubana* there may be a reddish stripe near the lateral margin of pronotum. The venation is the same as in typical form, but often the cross-veins are not so dark.

This is the form I considered as *C. lateralis* Guerin in my Revision of *Chrysopidae*, p. 150. Guerin's species came from southern Mexico, had larger wings, much longer antennae, and evidently is a Leucochrysa or Nodita.

We have *C. sanchezi* from Biscayne Bay (Mrs. Slosson), Miami (Moznette), Coconut Grove 5 to 28 May (Fairchild), Orlando, 18 March (Fernald) and Lower Metacumbe Key, 30 June (Bates) all Florida. It is fairly common in Western Cuba.

Chrysopa antillana Navas.

This goes in the *rufilabris* group; the antenna beyond the sixth or eighth joint is plainly a pale yellowish brown. There is a red stripe on the cheeks, and the palpi are marked with dark; there is also a red stripe each side on the pronotum, but in position different from all our other species, it is a little nearer to the median line than to the side margin.

The wings are moderately slender, tips slightly acute. Many of the cross-veins show more or less dark, particularly the radials and gradates. The gradates, about five and seven, are in subparallel rows, but wide apart, the inner much nearer to radial sector than to the outer row. The divisory veinlet ends beyond the cross-veins, and six cross-veins beyond it; the post-cubital area only a little wider than the cubital.

In hind wings nearly wholly pale greenish, the gradates partly dark, and here, as in fore wings the rows are far apart. The pronotum is nearly as long as broad, and the hind tibiae plainly a little fusiform.

Mr. M. Bates collected one specimen on Lower Metacumbe Key, Florida, 30 June.

Allochrysa virginica var. **ocala** n. var.

Differs from typical form in having a red stripe under each eye and a curved red line over the base of antennae; in fore wings the radial cross-veins are partly dark, the outer gradates dark; at last cubital cross-vein is a dark spot larger than in typical form, a dark spot at base of stigma distinct in both wings. On the mesonotum is a black spot at base of each fore wing, and a red spot each side on the anterior lobe. The basal part of the divisory cell is longer and more oblique than usual in *virginica*.

From Lloyd Sink, Jefferson Co., Florida, 9 Aug. (G. Fairchild). Type M. C. Z. No. 23184.

Allochrysa californica Navas.

Revista R. Acad. Cien. Nat. Madrid XXV, 36, 1928.

This is said to be from California, but the description gives no differences from *A. virginica* except slight venational ones of no specific value; possibly a wrongly labeled *virginica*. My *A. arizonica* has both series of gradates dark, a red band connecting fore wings, red marks above base of antennae, not mentioned in the description of *californica*.

DESCRIPTIONS OF THREE NEW SPECIES OF AGABUS FROM HUDSON BAY. (COLEOPTERA: DYTISCIDAE).

BY HUGH B. LEECH,

University of California, Berkeley, Calif.

Agabus hudsonicus n. sp.

A small (6-7 mm.) brownish testaceous species, with semi-transparent elytra and pronotum, and narrow metasternal lobes. It has somewhat the facies of *colymbus* described in this paper, but is not closely allied to it or to any described North American species.

Head rufo-testaceous, with basal median piceous spot which extends as an arm diagonally toward anterior margin of each eye. Pronotum rufo-testaceous, semi-transparent, piceous along anterior margin, and medially at base. Elytra brownish testaceous, paler toward margins of anterior half, the folded wings showing clearly beneath. Antennae and palpi rufo-testaceous, segments infuscate apically; legs rufo-testaceous, metatibiae darker. Mesosternum, metasternum, metacoxal plates, and sternites anteriorly, piceous; metacoxal processes, and sternites posteriorly, paler. Epipleura testaceous.

Male:—Length 6.25 mm.; width 3.10 mm. All antennal segments slightly longer than broad. Head finely reticulate, meshes unequal. Pronotal reticulation similar to that of head, meshes slightly coarser; anterior series of punctures continuous; marginal bead moderate, wider posteriorly. Elytral surface shining, reticulation fine, lightly impressed, the meshes unequal, coarser than those of pronotum, with punctures as large as the smaller meshes irregularly throughout; longitudinal series of coarse hair-bearing punctures distinct, placed as follows: sutural, discal, subhumeral, humeral, marginal.

Prosternal process narrow, weakly carinate, acuminate at tip, surface reticulate and sparsely pubescent. Metasternal sulcus narrow. Shortest distance between mesocoxa and metacoxal plate slightly more than one-quarter width of latter, measured along same line.

Pro- and mesotarsi moderately dilated, first three segments clothed beneath with flattened hairs. Anterior protarsal claws broader and straighter than their fellows, sinuate on lower margin; meso- and metatarsal claws simple. Profemora each with a dense patch of projecting golden hair extending along ventral margin from trochanter to outer third. Hind tibiae each without a row of punctures along posterior margin of lower face; a few discal punctures anteriorly. Basal metatarsal segments each with two rows of spinose punctures along lower margin, inner row shorter.

Male genitalia: Median lobe about as long as parameres, narrow, gradually tapering toward apex, slightly twisted to right apically (Fig. 3, B. C.) Parameres: strongly chitinised, with a small elongate apical appendage (Fig. 3, A.).

Female:—similar to male; pro- and mesotarsi, protarsal claws and profemora unmodified.

Holotype:— ♂, Churchill, Manitoba, July 7, 1937, (W. J. Brown). No. 4355 in the Canadian National Collection.

Allotype:— ♀, same data, July 1. In the Canadian National Collection.

Paratypes:—3 ♂ ♂, same data, June 23, July 1, August 18; 1 ♀, same data as holotype. Distributed as follows: 1 ♂, 1 ♀, Canadian National Collection; 1 ♂ California Academy of Sciences; 1 ♂, author's collection.

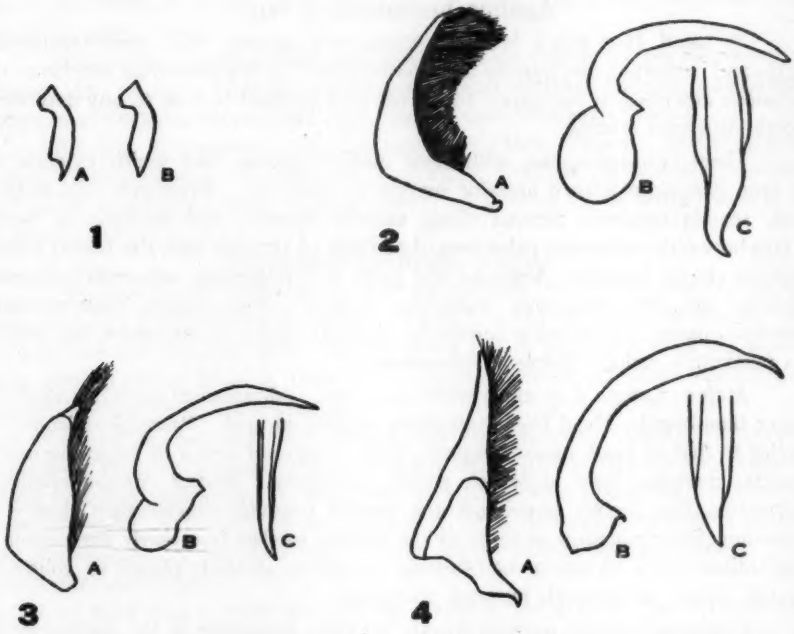


Fig. 1.—*Agabus colymbus* n. sp., anterior protarsal claw (A) typical, (B) modified. Fig. 2.—*A. colymbus* n. sp., male genitalia. Fig. 3.—*A. hudsonicus* n. sp. Fig 4. *A. browni* n. sp. (A) right paramere, outer side. (B) median lobe (aedeagus) lateral; the upper (convex) margin of each figure is the true ventral side, from which the intromittent organ is everted in coition. (C) apical half of aedeagus, ventral view, showing median groove from which the intromittent organ is everted.

This species belongs to *Eriglenus* Thoms., and is the first to be recorded from our fauna. *Eriglenus* has been variously treated as a distinct genus, or a subgenus of *Agabus*, by European writers; the latter course seems preferable. Of the six previously described species, all are Palaearctic; a key is given by Zimmermann and Gschwendtner (1935:71). *Hudsonicus* is closest to *labiatus* Brahm, of which I have both sexes for comparison; *labiatus* is rufo-piceous to piceous, more broadly ovate, and has the pronotal marginal bead twice as wide as in *hudsonicus*. It is possible that all my examples of *hudsonicus* may be slightly teneral; two of the paratypes are testaceous, and might run to *luteaster* Zaitz. in the key, the main division of which is based on color. The description of *luteaster* (Eastern Siberian, Werchojansk) given by Zimmerman, is taken from Zaitzev; it does not mention the male sexual characters, and presumably was based on females. It is possible that the Hudson Bay specimens are *luteaster* (Siberia), but until this can be proved, it seems best to give our material a name.

Agabus colymbus n. sp.

A small (6-7 mm.) aeneous species, facies of *punctulatus* Aube; head, pronotum and elytra shining in the male, pronotum and elytra dull in the female.

Head piceous; clypeus, labrum, area above bases of antennae, and a spot on each side of middle at base, testaceous. Pronotum piceous, pale testaceous laterally; in some specimens the piceous area is limited to the anterior and posterior margins, and a spot of variable size discally on each side of middle. Elytra of male piceous, testaceous laterally and narrowly along base, slightly aeneous; of female fuscous, paler laterally and along base, more strongly aeneous. Antennae and palpi testaceous, segments (especially terminals) infuscate apically. Legs pale testaceous to testaceous, metatarsi darker. Underside rufo-piceous to rufo-testaceous, paler medially. Epipleura pale testaceous.

Male:—Length 6.5 mm.; width 3.25 mm. Head shining, reticulation lightly impressed, meshes unequal. Pronotum shining, reticulation similar to that of head; anterior series of punctures narrowly interrupted at middle; pronotum with a low tumid area on middle of each side, about in line with inner margins of eyes; marginal bead as in *punctulatus;* posterior border of pronotum sinuate at each side of middle. Elytra shining, meshes of reticulation a little smaller and more deeply impressed than those of head and pronotum; scattered punctures occurring for the most part at intersections of meshes; the usual serial punctures present, not conspicuous.

Prosternal process short, bluntly pointed, narrowly margined, sparsely finely punctate and pubescent, subcarinate along median line; shortest distance between mesocoxa and metacoxal plate slightly less than one-half width of latter, measured along same line. Pro- and mesotarsi moderately dilated, first three segments each bearing a pad of hairs which are broadened and flattened apically to form small pallettes; first segment of each pro- and mesotarsus more than twice as long and wide as second, third, fourth and fifth progressively narrower than second. Protarsal claws short, the anterior one of each pair very broad almost to apex, thence obtusely truncate, apex acute. Metacoxal lines not or indistinctly attaining posterior border of metasternum. Metatibiae each with a longitudinal series of punctures paralleling ventral margin of anterior face. Basal segments of metatarsi each with two rows of spinose punctures along ventral edge, inner row shorter.

Male genitalia:—Median lobe enlarged basally, dorso-ventrally compressed, sinuate and twisted to right in apical third, tip rounded (Fig. 2, B.C.). Parameres tapering to a point, densely pubescent along concave margin, the surface with a series of elongate subparallel rugae (Fig. 2, A.).

Female:—Length 6.15 mm.; width 3 mm. Meshes of reticulation smaller and more nearly equal than in male, those of elytra not elongate discally at base. Elytra, and to a lesser extent the pronotum, with a minute secondary reticulation. Pro-and mesotarsi unmodified.

Holotype:— ♂, Churchill, Manitoba, June 23, 1937 (W. J. Brown). No. 4357 in the Canadian National Collection.

Allotype:— ♀, same data, July 1. In the Canadian National Collection.

Paratypes:—Churchill, Manitoba (W. J. Brown), June 17: 1 ♂; June 23:

33 ♂♂, 11 ♀♀; June 29: 2 ♂♂, 4 ♀♀; July 1: 11 ♂♂, 4 ♀♀; July 7; 30 ♂♂, 33 ♀♀; July 8: 2 ♂♂; 1 ♀, August 18: 1 ♂. Churchill, Man. (O. Bryant Hudson Bay, 1930. Trip, Lot 17, Van Dyke Collection), 2 ♂♂, 1 ♀, June 5, 1930. Four additional specimens (W. J. Brown) all males, have been examined; one of them has the left antenna 7-segmented. Paratypes distributed as follows:

60 ♂♂, 35 ♀♀ in the Canadian National Collection; 4 ♂♂, 4 ♀♀ in the California Academy of Sciences; 2 ♂♂, 2 ♀♀, to Dr. H. C. Fall; 2 ♂♂, 2 ♀♀ to Mr. R. Hopping; 2 ♂♂, 2 ♀♀ to Mr. J. B. Wallis; 2 ♂♂, 2 ♀♀ to the British Museum; 10 ♂♂, 6 ♀♀ in the author's collection.

Some of the paratypes are teneral, and hence lighter in color than the others. There is much variation in the shape of the anterior protarsal claws of the males; the claw may be almost squarely truncate apically, and not show the outer apical tooth at all, or the inner tooth may not be prominent (Fig. 1,A, B.); intermediate conditions occur between these and the typical form, and the two anterior claws may differ on the same beetle.

This species is most closely allied to *punctulatus* Aube. In the male of *colymbus* the pro- and mesotarsi are much more strongly dilated than in *punctulatus*. In the female of *colymbus* the elytra are very dull, the secondary reticulation being so strongly impressed as to almost obliterate the boundaries of the primary meshes; the primary meshes are not elongate basally on the disc. In *punctulatus* females the secondary reticulation does not obliterate the primary, and the meshes of the latter are elongate, especially basally on the disc.

There is enough variation in the shape of the male anterior protarsal claws in both *colymbus* and *punctulatus*, to invalidate the use of that character in separating the two species.

Agabus browni n. sp.

A rather large, elongate species (8-9 mm.), facies of *ambiguus* Say.

Head black, clypeus and a spot at each side of middle at base testaceous, labrum narrowly rufo-piceous anteriorly. Pronotum black, slightly aenescent, paler at anterior angles and along marginal bead. Elytra fuscous, progressively paler laterally. Antennae testaceous, segments infuscate apically. Palpi testaceous, ultimate segments usually darker. Legs rufo-testaceous, femora clouded with piceous. Prosternum and its process, meso- and metasternum, metacoxal plates, and sternites except along posterior margins, black. Epipleura testaceous.

Male:—Length (anterior margin of head to elytral apices) 9 mm.; width 4.5 mm. Head reticulate, meshes small and unequal. Meshes of pronotal reticulation slightly larger than those of head, more elongate discally, smaller and very dense laterally; anterior series of punctures not interrupted medially; lateral bead fine. Meshes of elytral reticulation smaller and less elongate than those of head or pronotum; the usual series of coarser punctures hardly apparent.

Prosternal process narrow, elongate, narrowly margined, smoothly convex, bluntly pointed apically; surface finely irregularly punctate. Metasternal sulcus well developed, deep and rather narrow. Metasternum impressed along median line from sulcus to posterior margin; metacoxal lines strongly impressed, strongly divergent, straight in anterior half and attaining posterior metacoxal border.

Shortest distance between mesocoxa and metacoxal plate slightly more than one-third width of latter, measured along same line.

Pro- and mesotarsi moderately dilated, first three segments each bearing a pad of rather sparse hairs which are dilated apically to form small pallettes; protarsal claws similar, as long as ultimate tarsal segment, slightly sinuate, anterior claw of each pair narrower and more strongly curved apically. Hind tibiae each with a series of punctures along lower margin of anterior face, the individual punctures irregular as to size and spacing; no discal punctures. Basal segments of metatarsi each with two rows of spinose punctures along lower margin, inner row shorter than outer.

Male genitalia: Median lobe longer than parameres, strongly narrowed apically in profile, tip turned upward and slightly to right; groove on ventral (convex) side widely open in apical half (Fig. 4, B, C.). Parameres: strongly chitinised basally, membranous in outer half, (Fig. 4, A.).

Female: Length 8.75 mm.; width 4.15 mm. Similar to male, but lacking modifications of pro- and mesotarsi.

Holotype: ♂, Churchill, Manitoba, July 1, 1937 (W. J. Brown), No. 4356 in the Canadian National Collection.

Allotype: ♀, same data, June 29. In the Canadian National Collection.

Paratypes: same data as type, 7 ♂ ♂, 4 ♀ ♀, August 18; 1 ♂ August 14; 1 ♀ July 1; 1 ♂ July 7. Paratypes distributed as follows: 4 ♂ ♂, 3 ♀ ♀ in the Canadian National Collection; 1 ♀ in the California Academy of Sciences; 1 ♂ to Dr. H. C. Fall; 1 ♂ to Mr. J. B. Wallis; 1 ♂ to the British Museum; 1 ♂ to Mr. R. Hopping; 1 ♂, 1 ♀ in the author's collection.

Browni runs in Fall's key to *anthracinus* Mannerheim, from which it can readily be separated by its pale epipleura. However both these species seem to be much more closely related to *ambiguus* Say and its allies, than to the species of the *nigroaeneus* Erichson section of Fall's key. The serial punctures close to and paralleling the lower anterior margin of each metatibia are variable, both as to the length of the series and the spacing of the individual punctures, in *strigalosus* Crotch, *ambiguus, erythropterus* Say, *anthracinus* and *browni;* the character is not a suitable one on which to separate out the last two species. In *austini* Crotch the serial punctures are reduced to three or four at the base, and there is very little variation shown. *Browni* (both sexes) may be separated from all of the above mentioned species except *austini* by its testaceous epipleura, and from *austini* by the much finer dorsal reticulation and the rounded tip of the prosternal process (acuminate in *austini*). It is a pleasure to dedicate this interesting species to Mr. W. J. Brown, who very generously submitted to me for study the new species described in this paper.

REFERENCES

Fall, H. C. 1922. A Review of the North American species of Agabus, together with a description of a New Genus and species of the Tribe Agabini, Mount Vernon, N. Y., J. D. Sherman. 1-36.

Zimmerman, A. and Gschwendtner, L. 1935. Monographie der palaarktischen Dytisciden. VI. Colymbetinae. Koleopt. Rund, 21: 61-92.

NOTES ON CERTAIN OF WALSINGHAM'S SPECIES OF OIDAEMATOPHORUS WITH DESCRIPTIONS OF NEW SPECIES (PTEROPHORIDAE)*.

BY J. McDUNNOUGH,
Ottawa, Ont.

For some time I have doubted whether the existing determinations of certain of Walsingham's species of plumes, based on the revision of this family by Barnes and Lindsey, were correct. Through the kind offices of Messrs. Tams and Stringer of the British Museum of Natural History I have been furnished with drawings of the left claspers of the male genitalia of a number of Walsingham's types in the genus *Oidaematophorus;* a study of these drawings in connection with my own slide material has confirmed my suspicions and shown that in at least two cases there had been misidentifications by the above-mentioned authors. With a view to clarifying the situation somewhat in this extremely difficult group I offer the following notes.

Oidaematophorus occidentalis Wlshm. In a previous discussion of this species (1936, Canadian Entomologist, LXVIII, 63) I pointed out (1) that the type specimen was of a distinctly tawny coloration and (2) that there was a possibility of two closely allied species being involved, basing my theory on the fact that larvae found on *Balsamorhiza* showed slight differences in the setae of their pupal cases from those taken feeding on *Grindelia* and that in the resulting imagos there also appeared to exist certain small differences in wing-coloration and male genital characters. Since writing the above a few specimens have been received from Fernie, B. C. (H. Leech), bred from an *Aster* sp., which agree with the *Grindelia* feeder.

From a study of the drawing of the left clasper of Walsingham's male holotype I should be inclined to consider the *Grindelia* and *Aster* feeders as agreeing best with this holotype and the fact that the wing-coloration is tawnier than that of the *Balsamorhiza* feeder would also point in the same direction. In the strict sense, therefore, the name *occidentalis* Wlshm. (with probably *californica* Grin. as a synonym) must be applied as above indicated. Whether the *Balsamorhiza* feeder represents a distinct species or a phytophagic form is a matter I do not feel competent at the present time to decide; much more larval material and the resulting adults must be studied before arriving at a definite opinion.

Oidaematophorus guttatus Wlshm. This species has been misidentified by Barnes and Lindsey. They seem, judging by their text, to have been misled by Meyrick's comparisons with the types in the British Museum for as a matter of fact their first idea that the species was equal to *mathewianus* Zell. comes very close to being correct. The drawing of the left clasper of Walsingham's type shows a structure very similar to that found in *mathewianus* Zell. and *downesi* McD. as figured in my paper (1927, Trans. Roy. Soc. Can. Sec. V, 185, Pl. I, figs. 12, 13)—possibly rather closer to the latter than to the former. I have set aside a few specimens from Los Angeles Co., Calif. under this name as they seem to fit in fairly well with Walsingham's figure, the forewings being rather unicolorous

*Contribution from the Division of Entomology (Systematic Entomology), Department of Agriculture, Ottawa.

light fawn-brown, darker than *mathewianus,* and without the contrasting dark, triangular patch between costa and base of cleft found in *downesi.* The actual relationship of these three names, however, will have to wait until such time as the larvae and their food-plant are known. It might be noted that the abdomen of Zeller's male type of *mathewianus* in the British Museum has been destroyed to such an extent as to make it impossible to prepare a genitalic slide from it, so no comparisons of the genitalia of the two types is possible.

For the species heretofore passing under the name *guttatus* Wlshm. a new name is necessary and I describe this species as follows:

Oidaematophorus phaceliae n. sp.

Oidaematophorus guttatus Barnes and Lindsey (*nec* Walsingham), 1921, Cont. N. Hist. Lep. N. Am. IV, No. 4, 388, Pl. XLV, fig. 16, Pl. LI, fig. 5; McDunnough, 1927, Trans. Roy. Soc. Can. Sec. V, 185, Pl. II, fig. 5; *id,* 1936, Can. Ent. LXVIII, 65.

Male. Palpi and front smoky brown; head between and behind antennae whitish; collar deep brown. Thorax largely creamy, crossed by a dark brown band in posterior portion. Abdomen dark brown shaded heavily with white dorsally on first three segments. Legs moderately tufted, brown, the tarsi white with each apical section brown; mid and hind tibiae ringed with white behind the apical spurs which are also largely whitish. Primaries deep fawn-brown, heavily sprinkled with white and smoky scaling, the former color predominating in basal portion of wing. A dark spot at base of cleft, shaded outwardly rather prominently with white; a dark dash above this on costa, connected with the spot at base of cleft by the usual dark shading, forming a quite prominent triangular patch. The costal dash is preceded and followed by white streaks beyond which, in the outer portion of the first lobe are two small, dark costal spots and a longer streak, the latter cutting the white costo- apical fringes; a small, subapical, dark spot on inner margin of lobe; fringes on inner margin of lobe smoky, with the exception of a narrow white streak arising from the dark subapical spot. Second lobe largely fawn-brown with slight black sprinkling and with several faint dark dots along outer margin; fringes smoky in cleft, white along outer margin with dark basal line and smoky suffusion below apex and at anal angle, along inner margin pale smoky. Secondaries smoky brown with pale smoky fringes.

Female. Very similar to male, somewhat more heavily marked, with traces of a dark longitudinal streak through first lobe of primaries, which at times also occurs in the males. Expanse, 25 mm.

Holotype—♂, Waterton Lakes, Alta., July 20, 1923, (J. McDunnough). Bred from *Phacelia heterophylla,* No. 4375 in the Canadian National Collection, Ottawa.

Allotype—♀, same data.

Paratypes—5♂, 11♀, same data, July 19-25, 1923, all bred specimens.

There is a long series of specimens before me, bred from larvae on *Hydrophyllum virginianum,* secured in the vicinity of Ottawa, Ont., which I am not including in the paratype series although they seem identical with the western specimens; the detailed larval description already published was drawn up from this eastern material.

Oidaematophorus grisescens Wlshm. In the drawing before me of the left clasper of the type there is a distinct indication of a small basal loop to the harpe

but not nearly as deep as in Barnes and Lindsey's figure (Pl. 54, fig. 4). I have already had occasion to comment on the genitalia of our British Columbia specimens (1927, *op. cit.* 186, Pl. 1, fig. 15), and find, on a comparison of further slide material from this locality with the above-mentioned drawing, that the basal loop is apparently less developed in our Canadian specimens; in this respect they agree with specimens from Estes Park, Colo. from which several slides have been made and to which the synonym, *acrias* Meyr., would apparently apply. Specimens from northern California agree best with the drawing of the genitalia but there seems nothing in the maculation to warrant separation. I am, therefore, leaving the synonymy as worked out by Barnes and Lindsey.

Oidaematophorus inconditus Wlshm. Another of Barnes and Lindsey's misidentifications. The true species, judging by the drawing before me, must be very close to *caudelli* Dyar; the left harpe is, however, broader basally and narrows suddenly near the apex, forming a distinct elbow on the outer side. There is a single male specimen before me from Summerland, B. C. which I hold under this name; the veins in the terminal area of primaries, especially in the second lobe, are outlined with brownish, giving a distinct strigate appearance; this feature was mentioned by Walsingham in his original description.

The species on which Barnes and Lindsey at least partially based their determination of *inconditus* is apparently without a name. I describe it as follows:

Oidaematophorus simplicissimus n. sp.

Male. Palpi, front and vertex of head light brownish with a broad pale creamy area on head between the antennae; palpi thin, pointed, of moderate length, projecting slightly beyond front. Thorax creamy with faint yellowish tinge. Abdomen whitish. Primaries pale creamy, shaded lightly with light brownish, more particularly in costal area, the inner margin and second lobe remaining pale. Fringes dull whitish with faint smoky tinge. No other maculation. Secondaries pale smoky white with paler fringes. Legs creamy, shaded with pale smoky.

Female. Essentially similar, at times with a slight general yellowish tinge. Expanse, 12-14 mm.

Holotype—San Diego, S. Calif., July 21, 1920; No. 4376 in the Canadian National Collection, Ottawa.

Allotype—same locality, July 20.

Paratypes—3 ♂, same locality.

Lindsey's figure of the left clasper (Plate 52, fig. 6) as *inconditus* Wlshm. matches that of the type specimen; as in *caudelli* the right clasper is considerably smaller.

In this complicated group of more or less unicolorous creamy or yellowish species from the southwestern area of the United States there appear to be several undescribed ones, separable only with certainty on male genitalic characters. Most of my material has reached me through the courtesy of Dr. J. Comstock of Los Angeles and Mr. and Mrs. J. Sperry of Riverside, Calif. whose trips into the desert regions have been so productive of interesting material. I append descriptions of these undescribed species.

Oidaematophorus contortus n. sp.

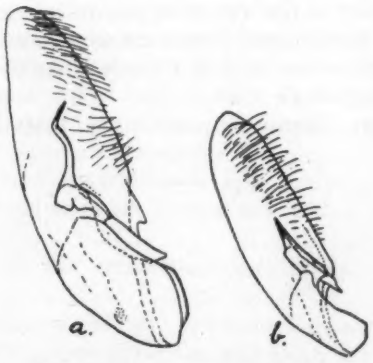
Palpi moderate, somewhat exceeding front, pale whitish. Head yellowish, with broad pale whitish area behind antennae. Antennae white, unbanded. Thorax and abdomen pale whitish yellow. Primaries dull whitish with a broad pale yellowish area extending along costa and occupying most of the first lobe. Veins on inner half of wing faintly outlined in pale brown. Fringes white. Secondaries pale smoky with still paler fringes, especially on third lobe. Beneath unicolorous pale smoky, costa outwardly narrowly yellowish; third lobe of hindwing paler, rather whitish. Legs whitish, fore and mid-tibiae and tarsi tinged with brown; spurs, especially of hind tibiae, long. The male genitalia are similar to those of *varius* B. & L. but the left harpe is rather longer and more twisted apically so that the point is directed towards the costa of clasper rather than towards the ventral margin. The right clasper is somewhat narrower but almost equal in length to the left one. Expanse, 20-22 mm.

Holotype—♂, Huachuca Mts., Ariz., June 2, 1935, (J. A. Comstock); No. 4377 in the Canadian National Collection, Ottawa.

Allotype—♀, same data, May 26, 1935.

Paratypes—3 ♂, Oracle, Ariz., May 5, 1935, (G. and J. Sperry).

Varius B. & L. is slightly smaller than the present species and has a distinct grayish tinge with more definitely marked veins, especially in the first lobe of primaries; it lacks all traces of the yellowish costal suffusion found in the present species. *Subochraceus* Wlshm. and *australis* Grin. possess considerably shorter palpi.



Left Claspers of a. *Oidaematophorus contortus* n. sp.; b. *O. rigidus* n. sp.

Oidaematophorus rigidus n. sp.

Scarcely separable from the preceding in coloration. Palpi pale ochreous, moderate, extending beyond head, third joint very pointed. Head brownish ochreous with broad pale band behind antennae which are whitish, unbanded. Thorax and abdomen pale whitish yellow. Primaries whitish with broad pale yellowish shading along costa and over most of first lobe; veins unmarked. Fringes concolorous. Secondaries almost concolorous with inner area of primaries, with very faint smoky tinge. Fringes pale. Beneath more faintly smoky

than in preceding species. Fore and mid legs more decidedly brownish than in *contortus;* hind legs pale whitish; spurs decidedly shorter than in preceding species, brown on mid legs, tipped with brown on hind legs. In the male genitalia the two claspers are subequal, distinguishing the species at once from *caudelli* Dyar; the left harpe is rather short with a stout basal half; narrowing rather abruptly to a short point, the whole straight (not twisted as in the preceding species) and pointing toward apex of clasper. Expanse, 22 mm.

Holotype— ♂, Little Rock, Los Angeles Co., Calif., Apr. 23, 1935, (J. A. Comstock); No. 4378 in the Canadian National Collection, Ottawa.

Paratypes—1 ♂, Independence, Inyo Co., Calif., Apr. 22, 1933; 1 ♂, Red Rock Canyon, Los Angeles Co., Calif., Apr. 21, 1933, (J. Comstock).

The paratype from Red Rock Canyon shows little of the yellowish tinge along costa found in the other two specimens, but agrees genitalically. Besides the above, two worn and stained males from Scoberg's Well, Calif., Apr. 22, 1935, (G. and J. Sperry) belong here on genitalia.

RESEARCH NOTES.

ROUNDWORM ATTACKING PEA MOTH

During the course of investigation of the pea moth, *Laspeyresia nigricana* Steph., on the Gaspe coast, observations showed that very severe mortality of the larvae may occur while they are in their cocoons in the soil. The indications were that some important parasite or predator might be exerting a powerful influence in reducing the pea moth population.

It now appears that a small species of roundworm can be held responsible for considerable mortality of the hibernating pea moth larvae. These roundworms belong to the genus *Neoaplectana.* Specimens were recovered from St. Godfroi, P. Que., and were identified by Dr. J. R. Christie of the United States Department of Agriculture, Washington, D. C.

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Mailed Saturday, July 2nd, 1938.